Site Audit Report
0503-1612-1

New Maitland Hospital
Lot 7314 in DP 1162607
Metford Road, Metford NSW

29 January 2018

51731-111832 (Rev 0)

JBS&G Australia Pty Ltd

www.jbsg.com.au

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List of Abbreviations

ACM	Asbestos containing material
AHD	Australian Height Datum
ANZECC	Australian & New Zealand Environment Conservation Council
Cd	Cadmium
COC	Chain of Custody
COPC	Contaminants of Potential Concern
Cr	Chromium
Cu	Copper
B(a)P	Benzo (a) pyrene
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
DP	Deposited Plan
DQI	Data Quality Indicator
DQO	Data Quality Objectives
EPA	New South Wales Environment Protection Authority
ESA	Environmental Site Assessment
Hg	Mercury
HIL	Health Based Investigation Level
LOR	Limit of Reporting
m bgs	Metres below ground surface
NEPC	National Environment Protection Council
Ni	Nickel
OPP	Organophosphorus Pesticide
PAH	Polycyclic Aromatic Hydrocarbons
Pb	Lead
PCB	Polychlorinated Biphenyls
PID	Photo-ionisation Detector
PIL	(Provisional) Phytotoxicity Based Investigation Level
QA/QC	Quality Assurance/Quality Control
RPD	Relative Percentage Difference
SAR	Site Audit Report
SAS	Site Audit Statement
TPH	Total Petroleum Hydrocarbons
VOC	Volatile Organic Compounds

1. Introduction

1.1 Introduction and Background

Andrew Lau, of JBS&G Australia Pty Ltd (JBS&G), was engaged by Health Infrastructure (HI, the client) on 9 October 2017 to conduct a site audit at the proposed New Maitland Hospital development site located at Metford Road, Metford NSW (the site). The site is legally identified as Lot 7314 in DP 1162607. Refer to **Appendix C** for the site layout.

The site is located within the former CSR/PGH Metford clay mine and brickworks site (the CSR site), which was predominantly used for quarrying, stockpiling, brickmaking and associated activities. A remedial action plan (RAP) was prepared for the site in July 2016 (GHD 2016), to address previously identified contamination issues to facilitate the proposed development of the site as a health services facility, including hospital (the New Maitland Hospital). Redevelopment of the site was proposed to involve a change of land use to include health care facility comprising long term care (hospitals, child care, aged facilities, hospices), commercial/industrial land use (training facilities, administration and ancillary buildings) and open spaces. The RAP was reviewed by the auditor and formed the basis of SAS and SAR issued by Andrew Lau on 12 July 2016 (Audit number 0503-1612).

Conclusions drawn by the auditor, a part of the abovementioned SAS and SAR stated that the remediation strategy proposed for the site was considered appropriate for the site given the identified contamination issues, and able to make the site suitable for the proposed health care facility uses, commercial/industrial uses and parks/open space uses, subject to the following:

- All of the sub-plans required under the RAP must be reviewed and accepted by site auditor prior to commencement of remediation works;
- A Material Tracking Plan (MTP) is required to be reviewed and accepted by a site auditor prior to commencement of any remediation or civil works; and
- The validation report and long term environmental management plan (LTEMP) must be reviewed and accepted by a site auditor prior to occupation.

Since the completion of the RAP (GHD 2016), it is understood that CSR has been progressively undertaking closure works for the broader CSR site. A site condition assessment was completed by GHD in October 2017 (GHD 2017), prior to the intended surrender of CSR tenement leases pertaining to the site and commencement of site redevelopment works. The objective of the current audit is to review the current contamination status of the site and to draw conclusions if the site can be made suitable for the proposed uses subject to remediation and validation in accordance with the RAP (GHD 2016).

Andrew Lau is a Site Auditor accredited by the NSW Environment Protection Authority (EPA) under the *Contaminated Land Management Act 1997* (CLM Act 1997) (Accreditation Number 0503). The audit reference number is 0503-1612-1.

1.2 Objectives of Audit

The objectives of this site audit were to:

- Independently review Environmental Site Assessment (ESA) reports and Remedial Action Plan (RAP) prepared for the site;
- Independently review the updated site condition report prepared for the site; and
- Prepare a Site Audit Report (SAR) and issue a Site Audit Statement (SAS) providing an opinion as to whether the remediation and validation process outlined in the RAP (GHD 2016) is considered appropriate to enable suitability of the site for the proposed development of the site for hospital related uses.

In accordance with the requirements of the CLM Act 1997, the site audit was undertaken with consideration to:

- The provisions of the CLM Act, Regulations and subsequent amendments;
- The provisions of any environmental planning instruments applying to the site; and
- Relevant guidelines made or approved by the EPA **(Appendix A)**.

1.3 Type of Audit

The audit is not being undertaken in response to a legal requirement imposed by the consent authority or the EPA, hence, the site audit has been conducted as a non-statutory audit.

1.4 Documents Reviewed

The following documents were reviewed as part of this audit:

- Phase 2 Environmental Site Assessment, New Maitland Hospital Stage 1 Development Area, Metford Road, Metford NSW 2015, GHD Pty Ltd, December 2015 (GHD 2015);
- Remedial Action Plan / Contamination Management Plan, New Maitland Hospital Stage 1 Development Area, Metford NSW, GHD Pty Ltd, July 2016 (GHD 2016); and
- New Maitland Hospital, Lot 7314 Site Condition Inspection, GHD Pty Ltd, 17 October 2017 (GHD 2017)

Reference was also made to data contained in the following previous reports as part of the site audit:

- Stage 2 Soil Investigation, CSR/PGH Maitland NSW, LeVert, September 2011 (LeVert 2011);
- Phase 2 Detailed Environmental Site Assessment CSR/PGH Maitland Metford Road, Metford NSW 2323, DLA Environmental Pty Ltd, January 2014 (DLA 2014a);
- Remediation Action Plan, CSR/PGH Metford, Metford Road, Metford NSW 2323, DLA Environmental Consultants Pty Ltd, May 2014 (DLA 2014b);
- Additional Environmental Investigation Former CSR Facility, Metford Road, Metford New South Wales 2323, December 2015, DLA Environmental Consultants Pty Ltd (DLA 2015);
- Closure Mine Operations Plan for Metford Clay Mine ML 1523, 5848, 4865 and 5090, VGT Pty Ltd, March 2015 (VGT 2015);
- Screening Health and Environmental Risk Assessment, Former CSR Facility, Metford NSW, Golder Associates, December 2015 (Golder 2015); and
- Report on Geotechnical investigation, Proposed New Maitland Hospital, Metford Road, Metford, Douglas Partners Pty Ltd, November 2015 (DP 2015).
- Site Audit Report 0503-1612, Lot 7314 in DP 1162607, New Maitland Hospital Stage 1 Development Area, Metford Road, Metford, Andrew Lau of JBS&G, 12 July 2016 (JBS&G 2016).

1.5 Site Inspections

The site was inspected on the date(s) shown in **Table 1.1**.

Table 1.1: Summary of Audit Inspections

Date	Attendance	Purpose
25 May 2016	Sahani Gunatunge (JBS&G) Jesse Simkus (GHD) Milos Rastovic (Catalyst Project Consulting)	Site Inspection to verify site layout and conditions

Date	Attendance	Purpose
12 October 2017	Sahani Gunatunge (JBS&G) Jesse Simkus (GHD)	Site inspection to verify site condition

1.6 Chronology of Site Assessment and Audit Works

The process of the assessment and audits undertaken at the site has been chronologically listed in **Table 1.2**.

Table 1.2: Summary of Investigation and Audit Works Undertaken at the Site

Date	Purpose
January 2014	A detailed environmental site assessment was completed across the CSR site. Field investigations were undertaken between May 2011 and November 2013 and comprised a total of 666 soil samples and 33 water samples. The analytical results were assessed against criteria applicable to open space and commercial/industrial land use with findings were presented in a report (DLA 2014a)
May 2014	A remedial action plan (RAP) (DLA 2014a) was prepared for the CSR site to address issues identified in previous site investigations to a standard suitable for mixed open space and commercial/industrial land use.
December 2015	An additional environmental investigation was completed at the CSR site including sampling from 18 pre-existing wells and seven new wells and soil vapour sampling from 14 sub-soil locations. Findings were presented in a report (DLA 2015).
December 2015	A data gap assessment was completed by GHD considering the combined previous investigation reports and appropriate land use scenarios and investigation levels for the proposed hospital. The consultant summarised findings made during previous investigations undertaken at the CSR site (LeVert 2011[1] and DLA 2014a) relevant to the current audit (Stage 1 development area). The field investigation undertaken by GHD comprised soil sampling from 108 test pits, five boreholes, 13 hand auger locations, four sediment samples. Samples were analysed for metals, PAHs, BTEX, TRH and fluoride with selected samples analysed for OCP, PCB, pH, CEC, PFC and asbestos. Groundwater investigation comprised sampling from eight monitoring wells and three surface water samples. Samples were analysed for metals, BTEX, PAH and TRH with selected samples analysed for PFC. The findings were presented in a report (GHD 2015).
April 2016	Commencement of the Site Audit for Stage 1 Area of the proposed Maitland Hospital (0503-1612) including review of previous reports.
July 2016	A RAP (GHD 2016) was prepared for the site providing a summary of identified site contamination issues and detailing the proposed remediation and soil management programs, procedures and standards which are to be followed during the course of the redevelopment, to ensure the successful remediation of the site for the protection of the environment and human health and render the site suitable for the proposed land uses.
July 2016	Preparation of a Site Audit Statement (0503-1612) and Site Audit Report confirming that the site can be made suitable for the proposed uses subject to remediation as outlined in the RAP (GHD 2016).
October 2017	Preparation of updated site condition report (GHD 2017) in consideration of time elapsed since previous investigations.
October 2017	Preparation of Site Audit Statement (0503-1612-1) and accompanying Site Audit Report confirming that the site can be made suitable for the proposed uses subject to remediation as outlined in the RAP (GHD 2016).

[1] Stage 2 Soil Investigation, CSR/PGH Maitland NSW, LeVert, September 2011.

2. Site Description

2.1 Site Identification

The site details have been summarised in **Table 2.1** and described in further detail in the following sections. Plans identifying the subject site has been presented in **Appendix C**. The site location and lay out is shown in **Appendix D**.

Table 2.1: Summary Site Details

Street Address	New Maitland Hospital Site, Metford Road, Metford NSW
Property Description	Lot 7314 DP 1162607
Parish	Maitland
County	Northumberland
Local Government Area	Maitland
Property Size	Approx. 17 ha
Zoning	Rural landscape (RU2) under Maitland City Council LEP 2011
Previous Uses	Clay mine / brickworks
Proposed Uses	Health Care facility comprising long term care (hospitals, child care, aged facilities, hospices) Commercial /industrial land use (training facilities, administration and ancillary buildings) Open Space (gardens, play areas)

2.2 Site Layout and Activities

The consultant (GHD 2015) divided the site into four main areas based on historical uses and previous disturbances and reported the following features observed at the time of site investigation works in October 2015:

Area 1

Located in the southwestern portion of the site, Area 1 comprised disturbed and undisturbed bushland. At the time of the site inspection, the area predominantly comprised native vegetation and lantana.

Topography was variable with steep banks in areas of the south and west/northwest. Stockpiles of fill and re-worked material were present across the area, primarily associated with fill along the eastern side of the area apparently pushed out from historical quarrying activities in Area 2, but also in the southwestern portion and some in the central portion of Area 1.

Mixed building waste, including concrete, metal and potential asbestos containing materials (ACM) was observed at isolated locations on the surface in the northwest portion (vicinity of HA401 and HA402), presumed to be from illegal dumping.

A series of small water bodies were located in a drainage line towards the southwestern corner of this area.

Area 2

Area 2, the most disturbed area of the site, is located to the north of Area 1. The area had been extensively quarried and filled. The consultant (GHD 2015) reported that approximately 80% of this area was unvegetated and comprised a number of large stockpiles and undulations with rock outcrops in the eastern portion of the area (adjacent to the large waterbody on the western and northern sides). The northern boundary formed part of a levelled area adjoining the CSR Site. Highwalls from the former quarrying activities remained along the southern and southwestern perimeters (adjoining Area 1), with noise berms pushed up along the top. Several small stockpiles were present in the northern portion. A large water filled body (formed by the dip of the geology at the base of the quarry excavation) is located at the eastern side of the area and an outcropping of carbonaceous material (extending into Area 3) is located in the south-eastern corner of the area. A

flat low lying area was present in the central western portion (most likely formed from quarrying activities), in between stockpiles and the western highwall. A single piece of potential ACM was identified on the surface near the top of the highwall along the southern boundary of the area (near TP415).

Area 3

Area 3 is located near the central portion of the site. The area had also been quarried (to a lower elevation than Area 2) and comprised a swampy / low-lying area and shallow water bodies in the central and northern portion. An access track was present running from east to west through the middle of this low lying area. The ground surface to the north of the track had been extensively disturbed with numerous small stockpiles (hummocks) and ditches. A large carbonaceous shale stockpile was located in the southern portion which extended across the majority of the area (Area 3) from east to west. A highwall from former quarrying activities remains to the south of the large carbonaceous stockpile. A portion of relatively undisturbed land, predominantly grassed or vegetated with native trees, remained present along the southern boundary above the highwall.

Area 4

Area 4 is located to the east of the site and generally comprised natural or disturbed vegetated land. The northwestern portion of the area consisted of relatively flat, low lying land with some hummocks of fill or excavated natural material, vegetated with scrub at the time of the inspection. A small stockpile located near MW401 predominantly comprised excavated natural material, however also contained building waste, including bricks, mortar and potential ACM (observed on the surface). The central portion of the area was elevated with steep banks on all sides, and densely vegetated with both native and lantana vegetation. A large gulley, likely remaining from quarrying, was present in the southern portion adjoining the highwall. The area remained elevated along the southern boundary and was densely vegetated with native trees.

2017 Update

A detailed site inspection was completed by GHD in October 2017. The consultant reported that the site remained largely unchanged with the following exceptions:

- Some clearing of grass/scrub and minor surface levelling observed in the northern portion of the site in the vicinity of the former gate opposite Fieldsend Street.
- A portion of the stockpiled material in the northern portion of the site (Area 1) had been removed and reused as fill on the adjacent lots that form part of the broader CSR site. No materials had been imported onto the site.
- The PACM previously observed at A04 (in the vicinity of HA402 in Area 1) in GHD (2015) appeared to have been removed
- Two fragments of PACM were observed on the ground surface in the vicinity of MW401 in Area 4. The PACM was reported to be in condition. PACM was previously observed on the surface of the small building waste stockpiles at this location during GHD (2015) investigation.
- The water body in the centre of the site had been pumped dry. Ponded water was not observed across the site indicative of preceding dry weather conditions with the exception of a small portion in the northern end of the water body.
- The channel from base of base of carbonaceous stockpile that drained into the water body was filled with surrounding excavated natural material.

2.3 Topography

The consultant (GHD 2015) reported that the southern portion of the site has an elevation of approximately 20 metres Australian Height Datum (mAHD), with variable falling landform to approximately 10 mAHD (not including the pits present in the central portion, predominantly Areas 2 and 3). A gully was reportedly present in the western portion (Area 1), falling towards Two Mile Creek to the northwest. The eastern portion (Area 4) was reported to fall to the east, towards Three Mile Creek. The central portion was reportedly disturbed by mining operations, with highly variable landform including mounds, channels and pits.

A steep highwall up to 10 m high extended along the southern portions of Areas 2, 3 and 4 with mounded fill, presumed to be a noise berm associated with the historical quarrying activities, located at the top of the highwall adjoining natural ground levels to the south, and the areas to the north generally at the base of the quarry or with material stockpiled above the base (in Areas 2, 3 and 4).

2.4 Soils and Geology

Based on information from previous investigations (LeVert 2011 and DLA 2014a), the consultant (DLA 2014b) summarised that regional geology comprises the Tomago Coal Measures consisting of shale, mudstone, sandstone, coal seams and clay layers. Carbonaceous layers have been excavated from the natural layers as part of the onsite works. These layers have been stockpiled on the site.

Geology encountered during previous investigations (DLA 2014a) generally comprised clay, brick and ash fills to a depth averaging approximately two metres deep. Beneath this were variable clays, silt stones, fine grained sandstones and shales. Most of these were exposed in the excavations associated with clay and shale extraction over the site. However, during the most recent site investigations, the consultant (GHD 2015) noted that large quantities of clay, brick and ash fills were not generally encountered on site, however, predominantly present on the former PGH land to the north of Area 2.

The sub surface profile reported by the consultant (GHD 2015) comprised fill materials up to depths of 6.0 m bgs comprising silty/sandy clay, sandy/clayey silt and sandy/silty clay with inclusions of domestic waste, bricks, coal chitter in Area 1 and 2. The consultant (GHD 2015) noted that anthropogenic waste was limited to the top meter and infrequent in Area 3 while coal gravel and brick fragments were observed in Area 4. The fill material was underlain by clayey sand and sandy clay approximately 2.6 m deep, further underlain by bedrock comprising sandstone, siltstone and shale with coal lenses.

2.5 Hydrology

The consultant (GHD 2015) reported that Area 1 appeared to drain to the northwest, towards Two Mile Creek, which is located approximately 300 metres to the west and 700 metres to the north. Further, it was reported that Area 4 appeared to drain to the east, towards Three Mile Creek, which is located approximately 400 metres to the east.

Areas 2 and 3 was reported to contain water bodies in low lying areas of the base of the former quarry. Highly variable landform in these areas has resulted in variable surface water flow. However, low lying land (wetlands), part of Four Mile Creek were reported to be present approximately 400-500 m to the northeast of the site (north of Raymond Terrace Road). The consultant (GHD 2015) noted that surface water from the site was likely to flow towards this feature.

The consultant (GHD 2015) noted that previous investigations (Levert 2011) identified stormwater at the site appeared to collect in the upper of five sedimentation ponds at the east site. Water flowed progressively through these to discharge from the site at the north eastern boundary into what is known as Three Mile Creek which flows north. The consultant (GHD 2015) noted that these sedimentation ponds were located to the north of Area 3.

2.6 Hydrogeology

During previous investigations (Levert 2011), perched groundwater was reportedly encountered in fill at depths of approximately two metres in some of the testpits, mainly along the north eastern part of the CSR site (to the north of currently identified Area 2). Further groundwater depths recorded in three groundwater monitoring bores were approximately 6.5 metres below ground level (m bgs).

Based on the more recent groundwater investigations (GHD 2015), the consultant reported that the groundwater flow direction was to be generally to the northeast, consistent with local topography. Due to identified wetlands approximately 500 metres to the northeast, the consultant anticipated the shallow unconfined groundwater flow to be to the northeast.

The consultant (GHD 2015) conducted an online search of the Department of Primary Industries Office of Water database (allwaterdata.water.nsw.gov.au, accessed 6 October 2015) which identified nine licenced groundwater bores within a 500 metre radius of the site, three of which were within or adjacent to the site. It was noted that there were no bores within 500 metres of the Site licenced for domestic, stock or irrigation use.

2.7 Surrounding Environment

The consultant (GHD 2015) reported that the site is surrounded by the following:

- North - CSR Site comprising former PGH Bricks & Pavers (sales and display and manufacturing areas) with Northern Railway, East Maitland Cemetery, Raymond Terrace Road, golf course and Two Mile Creek further north;
- South - Residential properties separated by power line easement;
- East - CSR Site comprising former PGH Bricks & Pavers quarry site (predominantly unused and vegetated with Northern Railway, East Maitland Cemetery (unused and vegetated), rural residential properties, Three Mile Creek, Raymond Terrace Road, model aircraft flying field and Four Mile Creek further east; and
- West - Metford Road with Fieldsend Oval playing field, Council Depot, industrial properties and Two Mile Creek further west.

2.8 Audit Findings

The information provided by the consultant (GHD 2015 and GHD 2017) in regards to the site condition and surrounding environment has been checked against, and generally meets the requirements of OEH 2011. The information provided was also consistent with the observations made during the site audit inspections.

The consultant (GHD 2017) reported that PACM impacted material previously identified in Area 1 and Area 4 was understood to have been removed by CSR's Site Manager with asbestos clearance certificates provided by the appointed environmental consultant. However, these asbestos clearance reports do not form part of the current audit and as such, the auditor considers this information to be anecdotal only. Further, it is noted that two fragments of PACM were observed on the ground surface in the vicinity of MW401 in Area 4 during the audit inspection completed in October 2017, consistent with GHD (2017).

The auditor notes that the previous consultants did not provide information of acid sulfate soils on site. For completeness, the auditor reviewed Acid Sulfate Soil Risk Map for Beresfield[2], which reports no known occurrence of acid sulfate soil materials within the soil profile located on site.

[2] Acid Sulfate Soil Risk Map – Beresfield, NSW Edition 2, 1997, 1:250 000 Ref: 9232N3, NSW Department of Land and Water Conservation.

For completeness, the auditor conducted a review of Bureau of Meteorology (BoM) climate statistics for Paterson (Tocal AWS)[3] which indicated the following:

- Mean maximum temperatures ranging from 17.4 °C in July to 29.7 °C in January;
- Mean minimum temperatures ranging from 6.2 °C in July to 17.6°C in January and February; and
- Mean monthly rainfall ranging from 37.4 mm in August to 117.5 mm in February, with an average annual rainfall of 942.1 mm.

In general, the climate of the site area is described as comprising warm summers and mild winters, and rainfall described as occurring throughout the year with wetter periods from January to March.

Overall, the information provided by the consultants (DLA 2014a, GHD 2015 and GHD 2017) in relation to the site condition and the surrounding environment is considered appropriate for the purposes of assessing the contamination status of the site.

[3] Bureau of Meteorology Climate Statistics for Paterson (Tocal AWS) http://www.bom.gov.au/climate/averages/tables/cw_061250.shtml, accessed 10 May 2016

3. Site History

3.1 Site History Information Sources

A review of available historical information was undertaken by the consultant (DLA 2014a) for the CSR site. Historical information was obtained from the following sources.

- Aerial Photographs
- Historical Title Search
- NSW EPA Records
- WorkCover NSW Records

3.2 Aerial Photographs

The consultant (DLA 2014a) undertook an aerial photograph review of the CSR site, with the following information provided:

- 1952 – The CSR site comprised vacant rural land that has been extensively cleared. There appeared to be a large cleared area that is devoid of vegetation in the current stockpile storage area in the vicinity original areas of quarrying, identified as Pit 2. Some facilities belonging to the original factory site were observed on the north eastern side of Metford Rd, with the start of what appears to be the large quarry void under excavation. Some access roads were visible on the south-western side of Metford Road but the site appeared to be largely untouched.

  The surrounding landscape was cleared rural lands with remnant bushland south west of the CSR site. A residential area existed to the north-east of the CSR site with many vacant blocks observed.

- 1954 - Very little change was observed from previous picture to the majority of the CSR site, however new structures were visible in the current factory location on the adjacent site on the southern southeastern side of Metford Rd.

  Slight increase in urban density was evident in the surrounding area.

- 1965 - The only changes visible from the previous aerial photos were an increase in the size of the excavation on the North-western side of Metford Road, and on the south-eastern side of Metford Road a new excavation is visible in the very centre of the CSR site.

  Very little observable change was reported in the surrounding areas in comparison to previous image.

- 1975 - On site quarrying activities were clearly visible and had been extended to the southwest on the southern portion of the CSR site, and the excavation on the northern portion of the CSR site has also been extended to the south and west of its former boundary. The large factory had been constructed on the southern portion of the CSR site and the factory resembled its final form at the time of decommissioning.

  There had been a significant increase in urban density in the areas surrounding the CSR site. The residential suburb of Metford to the south was partially constructed, and there had been a general increase in urban density to the north-west of the CSR site.

- 1979 - Continued on site quarrying activities were observable, but did not appear to have increased significantly in the existing excavation area since 1975. The most significant change to the CSR site was the new excavation at the very far eastern corner adjacent to the rail corridor. This area was excavated for raw materials beginning sometime between 1975 and 1979.

The continued expansion of the Metford residential area was still underway. Little change was observed in comparison to the previous image.

- 1987 - Continued on site quarrying activities were observable with a new large quarry void evident directly to the south of the buildings.

  Fieldsend oval had been constructed adjacent to the south (northern side Metford Road) and west of the CSR site (southern side Metford Road).

- 1993 - The portion of the CSR site located on the northern side of Metford Road had a large water dam where the previous quarrying area existed. This side of the CSR site appeared to be used mainly for product storage and workshop space. A new cleared area was visible on the southern portion of the CSR site in the area south-east of the factory which was later used as a water storage area.

  There was a slight increase in urban density surrounding the site, however the suburb of Metford existed generally in its current configuration at the time of the investigation (DLA 2014a).

- 2001 - The area surrounding the factory was relatively unchanged from the previous aerial image. Changes to the layout of centre of the site were visible, vegetation was encroaching back into the centre of the site suggesting these areas were no longer used for storage of raw material or high traffic areas. The dam water storage area was visible just east of the centre of the southern side of the CSR site.

  Very little changes were observed in the surrounding areas in comparison to the previous image.

3.3 Historical Title Search

Historical title information obtained by the consultant (DLA 2014a) identified the CSR site as Crown Land prior to 1986, at which time Acmil Industries Pty Ltd took ownership under a perpetual lease and remained the registered land owner till 1990, when the lease was transferred to Eki Pty Ltd. The lease was transferred to the current owner, Monier PGH Holdings in 2002.

3.4 NSW EPA Records

A search of the NSW EPA contaminated land database was undertaken by the consultant (DLA 2014a). All records pertaining to Section 58 of the Contaminated Land Management Act 1997 revealed that the CSR Site at Metford Road, Metford NSW is not encumbered by any notices from the NSW EPA with regard to contaminated land. Additionally, no sites in the vicinity of the site were encumbered by any notices.

3.5 WorkCover NSW Records

A search of the WorkCover Dangerous Goods Licence database undertaken by the consultant (DLA 2014a) indicated that dangerous goods have historically been stored at the CSR Site, with Licences 35/015192 and 35/014231 relating to the CSR site. The consultant (DLA 2014a) further reported that the site does not have any current Dangerous Goods Licences.

3.6 Heritage/Archaeological Items

The consultant (DLA 2014a) reported that no items of heritage or archaeological significance were identified at the CSR site from historical review or site inspection.

3.7 Previous Reports

The consultant undertook an assessment of previous works conducted at the entire CSR site prior to undertaking site investigation works. A summary of information relevant to the current site (Stage 1 investigation area) was provided in the consultant's report (GHD 2015).

Area 1

DLA (2014a) completed five test pits (TP218, TP219, TP220, TP221 and TP222) and additionally included one surface water sample location (identified as 'Entry Dam').

No issues were identified in relation to stockpiled material or fill.

Area 2

Levert (2011) completed two test pits (TP71 and TP72), and one surface sample (S3). Investigation results indicated Area H (Pit 2), Area G (brick fill) and Area F (calcium fluoride waste) may extend into Area 2 and Area 3 (**Appendix D**).

DLA (2014a) completed 12 testpits (TP125, TP126, TP127, TP128, TP129, TP130, TP131, TP132, TP133, TP201, TP244 and TP245); and two stockpile samples (SP4-1 and SP4-2). Groundwater investigation undertaken by consultant (DLA 2014a) included one sampling location (MW6). The investigation identified TP245 and stockpile 4 (SP4) each had an exceedance of the HSL A/B (sand < 1 m) for TRH F2. Only SP4 exceeded the DLA site assessment criteria (SAC) (commercial/industrial). These locations are present along the northern boundary of Area 2. The consultant (GHD 2015) noted that it was not known if SP4 remained in this location, but noted it may correspond to a small stockpile of mixed fill, bricks and concrete sampled by TP401 in GHD's investigation.

Area 3

LeVert (2011) completed three test pits (TP42, TP69 and TP70). Subsequently, consultant (DLA 2014a) completed 17 test pits (TP134, TP135, TP193, TP195, TP196, TP197, TP200, TP205, TP206, TP207, TP208, TP209, TP210, TP211, TP212, TP235 and TP236).

DLA locations TP134 and TP135 recorded hydrocarbon detections within a large carbonaceous shale stockpile situated on the southern portion of the Site. Detections were below the SAC but review by GHD indicated concentrations exceeded the HSL A/B vapour intrusion criteria (sand < 1 m and 1 m to 2 m) for TRH F2. A sample in TP210 also exceeded HSL A/B criteria (sand < 1 m) for TRH F2.

DLA stated the source of hydrocarbons remains undetermined in this area and no possible sources are readily evident. DLA considered it most likely that the hydrocarbon detections are from naturally occurring shale oil from the carbonaceous material.

Area 4

LeVert (2011) completed two test pits in this area (TP67 and TP68), while consultant (DLA 2014a) completed eight test pits (TP136, TP137, TP138, TP139, TP140, TP141, TP170 and TP171).

DP (2015) investigation identified several stockpiles located in the area between 1 -3 m in height. There is also a small area of fill at approx. <1 m depth in the area. A large body of eroded sediment is located along the eastern portion of the area.

3.8 Audit Findings

The site information provided by the consultant (DLA 2014a) has been checked against, and generally meets the requirements of the of OEH 2011, however the consultant did not research Maitland City Council records including Section 149 Certificate.

The auditor conducted an updated search of the search of available NSW EPA online information databases on 30 May 2017, including updated searches of the CLM register, the POEO register and the list NSW Contaminated Sites Notified to EPA, with the following findings (search records provided in **Appendix E**):

- A search of the CLM register did not discover any notices issued under the Contaminated Land Management (CLM) Act 1997 related to the site.

- A search of the POEO register did not identify any licences under Protection of the Environment Operations Act 1997 (POEO Act) referring to the site. A POEO licence (Licence No. 10012, surrendered May 2000) was identified relating to a CSR/PGH Brickworks Fieldsend site, located across Metford Road to the west of the CSR/PGH Brickworks Metford site. Permitted activities included solid waste land filling/ environmentally sensitive landfilling.
- A search of the List of NSW Contaminated Sites Notified to EPA did not identify any locations related to the site.

The extent of the site history information presented by the consultant (DLA 2014a) in conjunction with updated regulatory searches completed as part of this audit, is considered adequately complete for the purposes of identifying contamination issues at the site as part of the site investigation process.

4. Conceptual Site Model

4.1 Overview

The National Environment Protection (Assessment of Site Contamination) Measure, NEPC, 1999 (as amended 2013, NEPC 2013) identifies a conceptual site model (CSM) as a representation of site related information regarding contamination sources, receptors, and exposure pathways between those sources and receptors. The development of a CSM is an essential part of all site assessments and remediation activities.

NEPC (2013) identified the essential elements of a CSM as including:

- Known and potential sources of contamination and contaminants of concern including the mechanism(s) of contamination;
- Potentially affected media (soil, sediment, groundwater, surface water, indoor and ambient air);
- Human and ecological receptors;
- Potential and complete exposure pathways; and
- Any potential preferential pathways for vapour migration (if potential for vapours identified).

Based on known contamination, the consultant (GHD 2015) assessed the elements of CSM as outlined above, taking into consideration the sources of contamination that have been confirmed at the site. Each of the elements of the CSM are discussed as follows:

4.2 Sources of Contamination

Based on the site history review, the consultant (GHD 2015) identified the following areas of potential contamination and associated contaminants of potential concern (COPC):

Area 1

- Potential uncontrolled dumping of materials, including materials within fill/ overburden that may have been pushed up from historical quarrying activities on the adjacent Area 2; and
- Contaminants from dumping or migration from off-site areas.

Identified COPCs included total recoverable hydrocarbons (TRH), polycyclic aromatic hydrocarbons (PAH), heavy metals, fluoride, organochlorine pesticides (OCP), polychlorinated biphenyls (PCB) and asbestos.

Area 2

- Stockpiled material at SP4 in northern portion of Area 2. COPCs included TRH;
- Fill associated with Pit 2 which extends marginally into the northern corner of Area 2. COPCs included TRH, PAH, metals, OCP, PCB and asbestos;
- Brick fill in the northeast corner of Area 2 as identified in LeVert (2011). COPCs included TRH, PAH, metals, fluoride, OCP, PCB and asbestos;
- Possible foreign materials in stockpiles of quarried material. COPCs included TRH, PAH, metals, fluoride, OCP, PCB and asbestos;
- Calcium fluoride waste in the northeast corner of Area 2 as identified in LeVert (2011). COPCs included fluoride;

- Carbonaceous shale and coal outcropping in south-eastern portion of Area 2, down-slope from large carbonaceous shale stockpile in Area 3. COPCs included TRH, PAH and per-fluorinated compounds (PFC) associated with fire-fighting foam; and
- Accumulation of contaminants in sediments or surface water in the large water body in the eastern portion of the area. COPCs included TRH, PAH, metals, fluoride, OCP and PCB.

Area 3

- Carbonaceous shale stockpile in southern portion of Area 3, which previous reports indicated to have spontaneously combusted at some time, which the consultant (GHD 2015) considered may have been extinguished using fire-fighting foam. As such, COPCs included TRH, PAH and PFC associated with fire-fighting foam;
- Carbonaceous shale and coal outcroppings in south-western portion of Area 3, down-slope from large carbonaceous shale stockpile. COPCs included TRH, PAH; and
- Stockpiles and fill materials. COPCs included TRH, PAH, metals, fluoride, OCP, PCB and asbestos.

Area 4

- No known sources were identified in Area 4. Broad COPCs included TRH, PAH, metals, fluoride, OCP, PCB and asbestos.

4.3 Potentially Affected Media

The consultant (GHD 2015) noted that reported COPCs are likely to occur in the fill materials and underlying natural soils and rock. Additionally, the consultant (GHD 2015) reported assessed surface water and groundwater at the site as potentially contaminated media.

4.4 Potential Exposure Pathways

The consultant (GHD 2015) reported the potential transport mechanisms by which the site derived contaminants may be transported, including:

- Inhalation of dust that may be created from stockpiles and unsealed surfaces and filled areas of the site.
- Ingestion of contaminants due to direct contact with contaminated soils and surface water.
- Sorption through biological membranes such as skin when in direct contact with contaminated soil, surface water or groundwater.
- Use of groundwater for domestic or irrigation purposes;
- Groundwater discharge to Four Mile Creek or other intervening surface water bodies supporting natural ecosystems.
- Direct contact contaminated surface water run-off with benthic and aquatic flora and fauna within off-site surface water receiving environments.

4.5 Potential Human and Ecological Receptors

Based on site history, assessment of primary exposure pathways and current/proposed site use, the consultant (GHD 2015) identified a number of potential human and ecological receptors of contamination at the site.

Human Receptors include:

- Construction workers during redevelopment of the site;

- Future site users / visitors (including potential for long-term patients and associated visitors e.g. family); and
- Off-site receptors (e.g. residents on neighbouring properties, users of nearby water courses for recreational purposes, users of groundwater as potable resource).

Environmental Receptors include:

- On-site flora and fauna; and
- Off-site ecosystems including down-gradient surface water environments (e.g. creeks and wetland).

4.6 Audit Findings

The consultant (GHD 2015) identified a number of potential contamination issues at the site, and based on the site history review and taking into consideration the above, the auditor considers that the list of COPCs was adequate in assessing the nature and extent of contamination across the site. The consultant also considered potential exposure pathways and subsequent human and ecological receptors.

The auditor also notes that the CSM prepared in GHD (2016) as part of the development of the RAP generally meets the requirements of NEPC 2013.

Overall, the auditor considers that the identified potential contamination issues, potential exposure pathways and receptors, were appropriate for assessing the nature and extent of contamination present at the site.

5. Sampling Analytical and Quality Program

5.1 Data Quality Assessment

An assessment of data quality has been undertaken by the consultants by developing data quality indicators (DQIs), broadly based on the seven-step process referred to in NEPC 2013.

The auditor has undertaken a review of the QA/QC undertaken by the consultants, which has been summarised in **Table 5.1** against the PARCC parameters (precision, accuracy, representativeness, comparability and completeness).

The consultant (GHD 2015) reviewed previous investigations (LeVert 2011 and DLA 2014a) undertaken at the broader CSR clay mine/ brickworks site and provided a summary of works completed and findings relevant to current Stage 1 Development Area as well as a summary of tabulated results. The auditor notes that the preliminary investigation report prepared by Levert (2011) was not made available for review, while the copy provided of DLA (2014a) was incomplete and did not include information pertaining to QA/QC. Due to the absence of detailed information pertaining to QA/QC, sampling methodology, laboratory results and procedures, the data from these investigations are considered indicative only and has not been included as part of the data usability assessment, as discussed below.

Table 5.1 Data Usability Assessment (GHD 2015)

Parameter	DQIs	Requirement	Auditor Assessment
Field and Lab QA/QC			
Precision	Intra-laboratory duplicates (blind)	Collected at a rate of 1 per 20 samples. Analysed for primary contaminants of concern. RPDs less than 50%.	Soil duplicates were collected at a rate of 12% and were analysed for heavy metals TRH, BTEX, PAH and PCBs. RPDs ranged from 0-149 %, with elevated RPDs reported for metals (12 samples), TRHs (4 samples) and PAHs (3 samples). The consultant (GHD 2015) considered that the elevated RPDs were generally due to the heterogeneity soil or fill materials or low analyte concentrations. The auditor considers that the RPDs do not significantly affect the reliability of the data set. And to be indicative of variability of concentrations of the fill at selected locations; and concentrations being close to the laboratory LOR or low actual concentrations.
			Groundwater duplicates were collected at a rate of 10%. RPDs ranged from 0-10% and were within the acceptable range, with no exceedances reported.
Precision	Inter-laboratory duplicates (spilt)	Collected at a rate of 1 per 20 samples. Analysed for primary contaminants of concern. RPDs less than 50%.	Soil duplicates were collected at a rate of 5 % and were analysed for the main contaminants of concern. RPDs ranged from 0-174 %, with elevated RPDs reported for metals (7 samples), TRHs (2 samples) and PAHs compounds (2 samples). The consultant (GHD 2015) considered that the elevated RPDs were generally due to the heterogeneity soil or fill materials or low analyte concentrations. The auditor considers that the RPDs do not significantly affect the reliability of the data set. And to be indicative of variability of concentrations of the fill at selected locations; and concentrations being close to the laboratory LOR or low actual concentrations.
			Groundwater duplicates were not collected as part of the GHD (2015) investigation. Based on the small data set, the auditor considers this to be a minor non-conformance and not likely to affect the assessment of the data.

Parameter	DQIs	Requirement	Auditor Assessment
	Laboratory duplicates	One per batch. RPDs less than 50%.	Laboratory duplicates were undertaken by the primary laboratory (GHD 2015). The reported RPDs were within the DQI, however elevated RPDs were reported as follows: • Sample ES1533637-001 RPD for TPH C15-C28 and TRH >C16-C34; • Sample ES1533607-021, EW1512235—001 and ES1534334-001 RPD for Manganese; • Sample ES1533607-002 RPD for Zinc; and • ES1533724-039 RPD for Barium The laboratory attributed poor precision to sample heterogeneity which was confirmed by re-extraction and re-analysis.
Accuracy	Field rinsate blanks	Collected at a rate of 1 per piece of decontaminated sampling equipment. Analysed for primary contaminants of concern. Laboratory results below the laboratory limit of reporting (LOR).	Field rinsate blanks were not collected during the soil and groundwater investigation works (GHD 2015). The consultant reported that samples were collected directly from the excavator bucket or augers using dedicated disposable gloves to limit cross contamination between sampling points or only dedicated equipment was used during sampling of groundwater wells and surface water areas. The auditor considers the sampling methods employed by the consultant are unlikely to have resulted in significant cross-contamination between sample locations and a review of the available analytical data does not indicate that this has occurred.
	Trip blanks	Collected at a rate of 1 per day of sampling where primary contaminants of concern include volatiles. Analysed for volatiles of concern. Laboratory results below laboratory LOR.	Trip blanks were not collected during the soil sampling works undertaken (GHD 2015). The auditor notes that a review of the sample receipt advice shows that all eskies and sample containers were received intact and sealed by the laboratory, thereby reducing any potential for cross-contamination to have occurred. Further, TRH and BTEX results do not show a pattern of sustained elevated impact. As such, absence of trip blanks during the soil and groundwater investigation is considered to be a minor non-conformance not likely to affect the outcome of this audit.
	Trip spike	Collected at a rate of 1 per batch where primary contaminants of concern include volatiles. Laboratory results / recovery within 30 % of the spiked concentration.	No trip spikes were collected during the soil and groundwater investigations (GHD 2015). The consultant reported that trip spikes were omitted as volatile hydrocarbons were not considered a main contaminant of concern for the site. The auditor notes that a review of the sample receipt advice shows that all eskies and sample containers were received intact and sealed by the laboratory, thereby reducing any potential for cross-contamination to have occurred. Further, TRH and BTEX results do not show a pattern of sustained elevated impact. As such, absence of trip blanks during the soil and groundwater investigation is considered to be a minor non-conformance not likely to affect the outcome of this audit.
Accuracy	Laboratory surrogate spikes	Surrogate spikes to be performed as required by NATA accreditation,	Surrogate recoveries were within laboratory control limits with the following exceptions: • Recovery for vTRH/BTEX surrogate 1,2- dichloroethane-D4 for samples BH400_BH601_0.0-0.1 and TP414_1.7-1.9(71.6% and 71.4% respectively) was less than the

Parameter	DQIs	Requirement	Auditor Assessment
		generally per sample analysed. Recoveries to be within 70-130 % or 10-140 % (phenols and OCPs only).	lower data quality objective of 73%. As the recovery was only marginally under the DQO, the consultant considered this not to affect the quality of the data. • Recovery for vTRH/BTEX surrogates Toluene- D8 (73.8%) and 4-Bromofluorobenzene &70.7%) for sample TP450_0.5-0.7 were less than the lower data quality objective (74% and 72%, respectively). The consultant noted that this may lead to reduced recovery of those compounds, however the recoveries were only marginally below the lower limit and were considered unlikely to affect the interpretation of results. The auditor concurs with the consultant's findings and considers this to be a minor non-conformance not likely to affect the representativeness of the data.
	Laboratory method blanks	Laboratory method blanks to be performed as required by NATA accreditation, generally 1 blank per batch. Results to be below laboratory LOR.	All laboratory method blanks < LOR.
	Laboratory control samples (LCS)	LCS to be performed as required by NATA accreditation, generally one per 20 samples per batch. Recoveries to be within 70-130 % or 10-140 % (phenols and SVOCs only).	LCS recoveries ranged from 42.3-128 % and were within the laboratory control limits.
	Laboratory matrix spikes (MS)	MS to be performed as required as NATA accreditation, generally one per 20 samples per batch. Recoveries to be within 70-130 % or 10-140 % (phenols and OCPs only).	MS recoveries were generally within laboratory control limits with the following exceptions: • Sample ES1533818—003 matrix spike recovery of 68.5 less than lower data quality objective (10%) • Sample EB1531833—015 matrix spike recovery of 37.2% less than lower data quality objective (50%) for perfluorinated compounds PFDcA. The consultant noted that this may lead to reduced recovery of that compound in samples, however, all the remaining perfluorinated compounds were recovered within control limits so this is unlikely to affect the interpretation of results. • Spike recovery for Zinc for sample ES1533724--003 was not determined as background level greater than or equal to 4x spike level. This was not considered to impact results as the zinc spike recover for sample ES1533724--003 was within recovery limits for the same batch. • Spike recovery for sample EM1516073--002 for PFOS, PFHxA and PFHxS were not determined as background concentrations were equal to or greater than 4x spike level. The remaining PFC analytes were all within acceptable limits, as such, this was not expected to affect the quality of the data.

Parameter	DQIs	Requirement	Auditor Assessment
			• Matrix spike recovery of 37.2% less than lower data quality objective (50%) for perfluorinated compounds PFDcA in EB1531833--015. The consultant noted that this may lead to reduced recovery of that compound in samples, however, all the remaining perfluorinated compounds were recovered within control limits so this was considered unlikely to affect the interpretation of results. • Spike recovery for sample EM1516073—002 for PFOS, PFHxA and PFHxS were not determined as background concentrations were equal to or greater than 4x spike level. This was not considered to impact results as the remaining PFC spike recoveries for two anonymous samples were within recovery limits for the same batch. The consultant (GHD 2015) noted that frequency of matrix spikes did not achieve the NEPM 2013 Schedule B(3) and ALS QCS3 requirements for PAH/Phenols using method GC/MS – SIM or for TRH – semivolatile fraction in selected batches including ES153454, ES1534594 and ES1535751. The auditor notes that these batches contained less than 10 samples and considers not to reduce the precision of the testing laboratory or the accuracy of the results used for assessing site suitability.
Sampling and Analytical Schedule and Sampling Methodology			
Representa-tiveness	Soil sampling locations	Samples to be collected on a representative basis consistent with the CSM.	The recent GHD (2015) investigation targeting the current site ('Stage 1 Development Area') included 108 testpits, five boreholes, 13 hand auger locations and four sediment samples. Sample locations were chosen to address data gaps identified in the previous investigations. Considering the sampling locations completed in previous investigations (Levert 2011 and DLA 2014a), GHD (2015) investigation provided sufficient coverage in Areas 2, 3 and 4, however, the auditor notes that the number of sampling locations in Area 1 did not meet the EPA (1995) minimum sampling requirements. The auditor notes that Area 1 was identified by the consultant to be predominantly treed natural terrain with minimum identified anthropogenic activities, consistent with the observations made during the audit inspection. As such, the auditor considers the number of soil sampling locations and the rationale adopted by the consultant to be provide sufficient coverage noting the potential areas of concern and associated COPCs identified as part of the site history review.
	Soil sampling depths and intervals	Soil sampling depths should be consistent with the anticipated distribution of contamination as detailed in the consultant's CSM.	The sampling depths and intervals at each of the sampling locations were appropriate given the identified potential contamination sources and the site geology. Soil samples were collected from the fill material, with selected samples also collected from the underlying natural soils. The sampling depths were appropriate to assess the vertical extent of contamination and fill across the site, with numerous sampling locations extending to the natural soils. A review of the consultant's borehole logs confirmed the vertical and lateral extent of contamination within the fill materials, disturbed and in-situ material containing

Parameter	DQIs	Requirement	Auditor Assessment
			carbonaceous material was delineated during the investigation works.
	Soil sampling methodology	Soil samples to be collected using a methodology which is appropriate for the primary contaminants of concern.	Soil samples were collected directly from the soil profile, with deeper samples collected from the middle of the excavator bucket or directly from the outside of augers to minimise potential cross contamination (GHD 2015). The sampling method adopted by the consultant (GHD 2015) during the soil investigation works (directly from auger tip/excavator bucket), may cause the potential for volatilisation to occur during sampling. However comparison of the TPH and BTEX data between consultants are generally comparable, indicating that any potential volailisation occurring with differing sampling methods is considered to be low. Based on this, the auditor considers that the sampling methods adopted by the consultants during the investigation and validation works are considered appropriate and are not likely to affect the representativeness of the soil data.
	Sediment sampling locations and methodology		Sediment samples (Sed401, Sed402 and Sed403) were collected using an excavator by reaching into the deeper part of the water body with a bucket of sediment collected from the base of the water body (GHD 2015). Sample Sed404 was collected close to the water's edge, safely accessed on foot in shallow water (GHD 2015). The sample was collected up gradient from the sampler to avoid contamination, using a clean trowel and nitrile gloves, and was directly deposited into the laboratory-supplied glass jar.
	Surface water sampling locations and methodology		Direct grab samples of surface water (SW401, SW402 and SW403) were collected from the water bodies (GHD 2015) without disturbance of the water body to limit the potential for cross contamination and decanted into laboratory-supplied containers.
	Groundwater sampling locations	Groundwater sampling locations to assess areas of concern, allow for lateral delineation of contamination and assess the groundwater flow direction.	During the GHD (2015) investigation, groundwater wells were installed as follows: • One nested pair of groundwater wells installed in the southwestern corner of Area 1 (MW403 S&D), to provide an indication of up-gradient groundwater and perched groundwater conditions present on the site; • One nested pair of groundwater wells installed in the north western corner of Area 2 (MW400 S&D) and north western corner of Area 3 (MW404 S&D) to provide an indication of downgradient groundwater quality; perched groundwater conditions on the site; and whether groundwater from former CSR site to the north had the potential to impact the site. • Well MW402 to the south of Area 4 and MW401 to the north to provide an indication of up-gradient and down-gradient conditions respectively. The number and locations of monitoring wells installed was sufficient to provide an assessment of groundwater conditions at the site, particularly the potential areas of concern and associated potential contaminants of concern.
Representa-tiveness	Groundwater well construction	Wells to be constructed in accordance with	Monitoring wells targeting the deeper aquifer were screened as follows: • MW403D – 17 to 22 m bgs (siltstone/sandstone aquifer)

Parameter	DQIs	Requirement	Auditor Assessment
		the current version of the Minimum Constructions Requirements for Water Bores in Australia, and screened to target the likely contaminated portion of the water column.	• MW400D – 12 to 18 m bgs (sandstone aquifer) • MW404D – 6 to 9 (claystone aquifer) • MW402 – 4.3 to 10.3 m bgs (sandstone/claystone/siltstone) • MW401 – 7 to 12 m bgs (sandstone/shale) Shallow wells were screened as follows: • MW403S – 5 to 8 m bgs (shale and carbonaceous coal aquifer with siltstone and claystone) • MW400S – 1.3 to 5.8 m bgs (siltstone with coal/sandstone band) • MW404S – 0.3 to 1.0 m bgs (sandstone/ sandy clay) The consultant (GHD 2015) provided borehole logs detailing well construction, which indicated bentonite plug was suitably installed preventing the infiltration of any seepage water from overlying fill materials. Taking this into consideration, the auditor considers that the groundwater data is representative of site conditions.
	Groundwater sampling methodology	Groundwater samples to be collected approximately 7 days after well installation and development. Groundwater samples to be collected using low flow methods (where it can be demonstrated that this is appropriate), or by purging at least 3 well volumes, until field parameters have adequately stabilised.	Following well installation, the consultant (GHD 2015) noted that monitoring wells were developed using a bailer to remove material introduced during the drilling, however, exact volumes removed could not be determined as field notes were not provided. Monitoring wells were sampled after a period of five days following installation. Purging and sampling was undertaken using low flow techniques (micro purge pump). Field parameters, including pH, temperature, electrical conductivity, redox potential and dissolved oxygen were measured during purging using a calibrated water quality meter. Purging continued until the water quality parameters generally stabilized, whereupon samples were collected (DP 2011 and DP 2013a). Depth to water (DTW) was also measured pre, during and post purging. Field purging information, including general observations regarding odours and presence / absence of sheens PSH was provided by the consultant in the report. Taking into consideration the above, the auditor considers that the groundwater sampling method adopted by the consultant was generally considered appropriate and not likely to affect the representativeness of the data.
	Soil, sediment, surface water and groundwater sampling containers	Soil and sediment samples to be collected into laboratory supplied, clean unpreserved Teflon lined jars. Surface and groundwater samples to be collected into laboratory supplied, clean and appropriately	Surface soil samples were collected directly from the soil profile, with deeper samples collected from the middle of the excavator bucket or directly from the outside of augers to minimise potential cross contamination. Sediment samples were collected with the aid of an excavator bucket and clean trowel. Soil and sediment samples were collected in laboratory-provided glass jars or ziplock bags (appropriate to the relevant analyses) and stored in chilled eskies. Surface water and groundwater samples were immediately placed into appropriately preserved containers provided by the laboratory. The consultant (GHD 2015) reported that field filtering was not performed for samples for heavy metal analysis, however were filtered by the laboratory using a 0.45 µm filter prior to analysis.

Parameter	DQIs	Requirement	Auditor Assessment
		preserved sampling containers.	
Representa-tiveness	Soil and groundwater sampling equipment decontaminatio n	Soil sampling equipment to be decontamination between sampling locations or between sampling depths; and monitoring well locations where significant contamination is encountered.	All samples were collected using a new pair of disposable nitrile gloves (GHD 2015). Samples were collected from the middle of the excavator bucket or from the outside of the augers/middle of the hand auger to prevent any potential cross contamination. Further, the consultant (GHD 2015) reported that decontamination of the hand auger and hand tools was undertaken through a two stage approach. The first stage involved cleaning the equipment using a 5% mixture of phosphate free detergent (Decon® Neutracon) in water, followed deionised water as a final rinse stage. Groundwater sampling was undertaken using only dedicated equipment was used during sampling of groundwater wells and surface water areas. As such, decontamination of sampling equipment was not required (GHD 2015). The auditor considers the sampling methods employed by the consultants during the investigation works are unlikely to have resulted in significant cross-contamination between sample locations and a review of the available analytical data does not indicate that this has occurred.
	Soil sample contamination screening	Soil samples to be screened for contamination via visual / olfactory observations and photo-ionisation detector (PID) measurement.	As part of the investigation works (GHD 2015), the consultant provided borehole logs detailing observations of material types; visual and olfactory observations; sample depths; and groundwater observations. The consultant (GHD 2015) did not screen soil samples in the field using a PID during the field investigation. However, based on the site history, the lack of significant volatile contamination at the site, the absence of field VOC screening is not considered to affect the representativeness of the data.
	Sample storage and transport	Samples to be placed in an insulated container and chilled. Samples to be transported to laboratory under chain of custody conditions.	All soil samples were transported in ice-cooled chests (less than 4°C), under chain of custody conditions, to laboratories that were NATA accredited for the analysis performed.
Representa-tiveness	Laboratory sample receipt advice	No damaged containers. No samples submitted in containers which have not been chilled. No samples to be submitted without sufficient times to comply with recommended holding times.	Laboratory sample receipt advice provided by the nominated laboratories confirmed that all samples were received in suitable condition, with completed chain of custody documentation provided in the reports.
	Holding times	Samples to be extracted and analysed within	A review of the consultant's COC documentation and laboratory reports indicates that all samples were analysed

Parameter	DQIs	Requirement	Auditor Assessment
		recommended holding times.	within their holding times for all analyses undertaken, with some exceptions as noted below: • Sample TP400_0-0.2 was overdue for extraction of pH by one day TP411_0-0.2 and TP474_0.1-0.3 were overdue by 3 days, however the samples were analysed within holding times. • Nine water samples in lab batch ES1534541 were overdue for dissolved metal analysis by 3 days. The consultant noted that the metal concentrations may be biased low. • Sample SWQ was overdue for mercury, PAH and TPH analysis by 6 days which may have resulted in lower volatile concentrations. However, the auditor notes that volatile concentrations in the duplicate sample were comparable with the primary sample (SW403) and as such, not to affect the findings of this audit.
	Analytical Method	Samples to be analysed using NATA accredited methodology.	Laboratories used included: ALS Laboratory Group (primary for GHD 2015), Envirolab (primary for DLA 2014a) and SGS Australia (secondary DLA 2014a and GHD 2015). Laboratory certificates were NATA accredited. The laboratory LOR for PAH compounds anthracene, benzo(a)pyrene and phenanthrene were higher than the adopted groundwater investigation levels in the groundwater samples analysed (GHD 2015). The consultant did not provide a comment on the raised LOR in the report. However the auditor considers that the raised LORs do not affect the quality of the results, with the results still satisfactory for interpretation. The auditor notes that the consultant (GHD 2015) did not complete adequate asbestos sampling as noted below: Envirolab reported that reported that sub sampling was conducted on samples ES1534334-015 and 017 prior to asbestos analysis. As this has the potential to understate detection, results should be scrutinized accordingly and NATA accreditation does not apply to analysis on these samples. However, the auditor notes that adopted criteria of presence/absence is conservative and is considered suitable for the assessment of asbestos in soils at the site.
Complete-ness	Sampling, analysis and quality plan completeness	100 % of sampling, analysis and quality plan to be implemented.	On engagement of the site auditor in April 2016, a review of previous reports (including DLA 2014a) was undertaken with comments provided via email on 20 May 2016, indicating the suitability of previous reports, with no further investigation works, with the exception of validation works required.
	Field documentation	All relevant field documentation to be collated including sampling logs and calibration records.	The consultant (GHD 2015) provided borehole logs, well constructions details and groundwater field parameters. The consultant reported that groundwater field measurements were taken using a calibrated water quality meter, however, calibration certificates were not provided. The consultant provided sufficient detail of the nature of the works completed and the findings of the results in the report, as such, the auditor considers this information to be adequate and the lack of calibration certificates not to affect the completeness of this audit.

Parameter	DQIs	Requirement	Auditor Assessment
	Laboratory documentation	All relevant laboratory documentation to be collated, including chain of custody records, sample receipt advice and analytical reports.	The consultant provided all relevant COC documentation; laboratory sample receipt advice; and full laboratory certificates in the reports.
	Critical sample validity	All critical sample data to be valid.	The auditor considers that the data is considered reliable, for the purpose of the soil and groundwater investigation.
	Sampling, analysis and quality approach	Adequately comparable sampling, analysis and quality approach to be used throughout the project.	The auditor considers that the data is comparable, as consistent sampling methods were employed throughout the direction of the investigation works. Furthermore, consistent field staff were employed by each consultant during each phase of investigation. All laboratory analysis was undertaken by NATA accredited laboratories.
	Sampler	Samplers used throughout the project to have sufficient experience.	

The auditor additionally undertook review of the QA/QC undertaken by the consultant (GHD 2015) in relation to asbestos investigation at the site, which has been summarised in **Table 5.2** below against the PARCC parameters (precision, accuracy, representativeness, comparability and completeness).

Table 5.2: Data Usability Assessment – Asbestos (GHD 2015)

Parameter	DQI	Requirement	Auditor Assessment
Precision	Intra laboratory duplicates (blind)	Collected at a rate of 1 per 20 samples.	Soil intra laboratory and inter laboratory duplicates were not analysed for asbestos by the consultant. The auditor notes that the consultant analysed intra-laboratory duplicates for chemical COPCs at the required rate with generally acceptable RPDs received. Additionally, the auditor notes that the consultant reported that an asbestos management plan will be implemented as part of the proposed remediation works (**Section 8**).
	Inter laboratory duplicates (split)	Collected at a rate of 1 per 20 samples.	
Representative-ness	Sampling method	All sampling conducted in accordance with guidance documents (NEPC 2013 and WA DoH 2009)	The consultant collected asbestos mostly from test pits as recommended by WA DoH (2009) which enables buried ACM and FA to be readily identified. The consultant collected large sample size (at least 500 mL) to conduct asbestos analysis in accordance with WA DoH 2009 and NEPC 2013 site investigation / health screening levels.
	Holding times	Samples extracted and analysed within holding times	The auditor notes that there are no published holding times for the analysis of asbestos.

Parameter	DQI	Requirement	Auditor Assessment
Comparability	Sample collection and handling	Experienced field staff to conduct the works throughout the project to ensure consistent implementation of standard operating procedures.	The consultant reported that sampling was undertaken by an experienced GHD environmental scientist/engineer.
	Analytical methods	Standard analytical methods to be used. Analytical methods and limits of recovery appropriate for media and adopted site criteria.	According to the detailed laboratory certificates provided by the NATA accredited laboratory, the procedures and methods used for identification and quantitation of asbestos are consistent with AS4964-2004 and the requirements of NEPC 2013 for assessment of site contamination. The laboratory generally utilised the large sample size (at least 500 mL) to conduct asbestos analysis with some additional 40 g samples analysed.
	Field conditions, sampling staff and laboratory analysis	Consistent field conditions, sampling staff and laboratory analysis	Sampling was undertaken by an experienced GHD environmental scientist/engineer. No significant impact to field operations due to weather was reported. Primary laboratory ALS Environmental was used for all sample analysis.
	Limit of reporting	Limit of reporting appropriate and consistent	The nominal detection limit of the AS4964—2004 – Method for the Qualitative Identification of Asbestos in Bulk samples is 0.01% w/w (i.e. 0.1 g/kg). This detection limit is consistent with adopted site criteria. Furthermore the larger 500 mL samples submitted to the laboratory are considered to result in a substantially lower detection limit being achieved in practice as examination of a large sample size (>500 mL) may improve the likelihood of identifying asbestos material in the greater than 2 mm fraction. On this basis, the comparability of the analytical methods employed by the laboratory is considered to be appropriate for the purpose of the audit.
Completeness	Field and laboratory documentation	Complete field documentation including soil descriptions and COCs completed and appropriate	All field documentation including test pit logs and COCs were provided by the consultant. Soil descriptions adequately distinguished the different fill materials present at the site and delineated the extent of fill and natural soils (where encountered).
	Frequency and result for QC samples	Satisfactory frequency and result for QC samples	No duplicate samples were analysed for bonded ACM, FA and AF. However, the auditor notes that the consultant analysed intra-laboratory duplicates for chemical COPCs at the required rate with generally acceptable RPDs received. Additionally, the auditor notes that the consultant reported that an asbestos management plan will be implemented as part of the proposed remediation works (**Section 8**).
	Critical sample validity	All critical sample data to be valid.	The auditor considers the data to be reliable, for the purpose of the asbestos investigation.

The quality assurance/ quality control measures employed by the consultant (GHD 2015) were checked and found, overall, to adequately comply with the requirements outlined in OEH 2011, EPA 2017 and NEPC 2013. The laboratory QA/QC results have been reviewed and the results indicate that the analytical laboratories were achieving adequate levels of precision and accuracy. As such, the sampling, analytical and quality protocols undertaken by the consultant were considered to be

adequately reliable for the purpose of assessing the contamination status of the site; and is reliable and useable for the purpose of this audit.

6. Assessment Criteria

6.1 Soil Criteria

Previous investigation results (LeVert 2011) were assessed against the soil criteria based on the former NEPC 1999 Guidelines for a number of land use scenarios including Health-based Investigation Levels (HILs) for 'Residential with gardens and accessible soil (home-grown produce contributing <10% fruit and vegetable intake; no poultry) including children's day care centres, preschools, primary schools, town houses, villas' (NEHF A, NEPC 1999), HILs for 'Parks, recreational open space, playing fields including secondary schools' (NEHF E, NEPC 1999) and 'Commercial or industrial' (NEHF F, NEPC 1999) and EPA threshold concentrations for petroleum hydrocarbon compounds (NSW EPA 1994).

The DLA (2014a) investigation was undertaken in order to assess the site suitability for commercial/industrial and recreational /open space land use and as such, the adopted soil assessment criteria were based on revised NEPC (2013) guidelines including:

- HIL C – Public open space such as parks, playgrounds, playing fields, secondary schools and footpaths; and HIL D – Commercial/industrial includes premises such as shops, offices, factories and industrial sites;
- Health Screening Levels (HSLs) HSL C and HSL D for vapour intrusion; and
- Management Limits for TPH fractions in soil.

During the recent investigation (GHD 2015), the consultant adopted relevant soil assessment criteria in accordance with NEPC (2013) guidelines, considering the sensitive land use related to the proposed development of the site as a hospital as listed below. Additionally, the consultant (GHD 2015) reassessed historical data relevant to Stage 1 Development Area against the adopted site assessment criteria.

- HIL A – residential with garden/accessible soils;
- HIL B – residential with minimal opportunities for soil access;
- HIL C – open space purposes (public open space such as parks, playgrounds, playing fields e.g. ovals, secondary schools and footpaths);
- HSLs for Vapour Intrusion – HSL A/B and C for sand 0 to >4 m;
- HSLs for Intrusive Maintenance Workers (CRC Care 2011);
- HSLs for Direct Contact for TRH Fractions in Soil – HSL A, B and C, and intrusive maintenance worker (CRC Care 2011);
- Management Limits for TPH fractions in soil;
- HSLs for asbestos – HSL A and HSL C;
- US EPA risk based screening levels (RSLs) to be adopted in the absence of HIL/HSL guideline value; and
- Site specific Ecological Investigation Levels (EILs) and Ecological Screening Levels (ESLs) applicable to the upper 2 m of the sub surface for urban residential and public open space land scenario.

The consultant (GHD 2015) also referenced the NSW EPA (2014), "Waste Classification Guidelines Part 1: Classifying Waste" for assessing appropriate waste classification for materials requiring off-site disposal from across the site.

The consultant (GHD 2015) reported that consideration was given to any aesthetic issues identified on site, including the following:

- Chemically discoloured soils or large quantities of various types of inert refuse, particularly if unsightly and may cause ongoing concern to site users;
- Depth of the materials including chemical residue in relation to the final surface of the site; and
- Need and practicality of any long term management of foreign material.

The adopted soil criteria are referenced below in **Table 6.1, 6.2, 6.3 and 6.4.**

Table 6.1: Soil Criteria (mg/kg)

Substance	Health-Based Investigation Criteria (Residential) (HIL-A)[1]	Health-Based Investigation Criteria (Residential) (HIL-B)[2]	Health-Based Investigation Criteria (Recreational) (HIL-C)[3]	Ecological Investigation Levels (EILs)[4] Disturbed/undisturbed
Metals				
Arsenic	100	500	300	100
Barium	15 000[5]	-	-	190/250
Cadmium	20	150	90	
Chromium (III+VI)	100	500	300	
Copper	6000	30 000	17 000	60/95
Lead	300	1200	600	1100
Manganese	3800	14 000	19 000	
Mercury (inorganic)	40	120	80	
Nickel	400	1200	1200	30/170
Zinc	7400	60 000	30 000	70/180
PAHs				
Benzo (a) pyrene (as TEQ)	3	4	3	-
Naphthalene	-	-	-	170
Total PAHs	300	400	300	
PCBs				
Total PCBs	1	1	1	-
OCPs				
Aldrin+Dieldrin	6	10	10	-
Chlordane	50	90	70	-
DDT+DDD+DDE	240	600	400	180
Endosulfan	270	400	340	-
Endrin	10	20	20	
Heptachlor	6	10	10	
Hexachlorobenzene	10	15	10	
Methoxychlor	300	500	400	
PFC				
PFOA	16[6]	-	-	-
PFOS	6[6]	-	-	-
Asbestos				
Bonded ACM	0.01%	-	0.02%	-
FA and AF (friable)	0.001%			
All forms of asbestos	No visible asbestos for surface soils			
Other				
Fluoride	3100[5]	-	-	-

Note 1: HILs for residential with garden/accessible soil, home grown produce <10% (no poultry), childcare centres, preschools and primary schools – Table 1A (1) – NEPC 2013.

Note 2: HILs for Residential with minimal opportunities for soil access, including dwellings with fully and permanently paved space such as high-rise buildings and apartments - Table 1A (1) – NEPC 2013.

Note 3: HILs for public open space such as parks, playgrounds, playing fields, secondary schools and footpaths - Table 1A (1) – NEPC 2013.

Note 4: Consultant (GHD 2015) reported that EILs were based on urban residential site specific conditions including disturbed and undisturbed soil.

Note 5: US EPA residential soil regional screening level.
Note 6: US EPA toxicity derivation, and Region IX exposure factors.

Table 6.2: Soil HSLs for Vapour Intrusion (sand) (mg/kg)

Substance	HSL A&B[1]				HSL C[2]				Intrusive Maintenance Worker [3]	
	0 to <1 m	1 to <2 m	2 to <4 m	>4 m	0 to <1 m	1 to <2 m	2 to <4 m	>4 m	0 to <2 m	2 to <4 m
Benzene	0.5	0.5	0.5	0.5	NL	NL	NL	NL	77	160
Toluene	160	220	310	540	NL	NL	NL	NL	NL	NL
Ethyl benzene	55	NL	NL	NL	NL	NL	NL	NL	NL	NL
Xylenes	40	60	95	170	NL	NL	NL	NL	NL	NL
Naphthalene	3	NL	NL	NL	NL	NL	NL	NL	NL	NL
F1 (TRH C_6-C_{10} – BTEX)	45	70	110	200	NL	NL	NL	NL	NL	NL
F2 (TRH >C_{10}-C_{16} – naphthalene)	110	240	440	NL	NL	NL	NL	NL	NL	NL

Note 1: HSLs for low-high density residential – Table 1A (3) – NEPC 2013. The consultant (GHD 2015) considered soil type as sand as a conservative measure based on presence of sand in fill material.
Note 2: HSLs for recreational/open space – Table 1A (3) – NEPC 2013.
Note 3: HSLs for intrusive maintenance worker (shallow trench) – Table A3 (CRC Care 2011).
Note 4: NL – calculated HSL exceeds the solubility limit for the chemical of concern. To reach the maximum allowed breathable air concentrations, soil vapour source is required that is greater than is possible for a petroleum mixture.

Table 6.3: Soil HSLs for Direct Contact (mg/kg)

Substances	HSL A[1]	HSL B[2]	HSL C[3]	Intrusive Maintenance Worker[4]
Benzene	100	140	120	1100
Toluene	14 000	21 000	18 000	120 000
Ethyl benzene	4500	5900	5300	85 000
Xylenes	12 000	17 000	15 000	130 000
Naphthalene	1400	2200	1900	29 000
TRH C_6-C_{10}	4400	5600	5100	82 000
TRH >C_{10}-C_{16}	3300	4200	3800	62 000
TRH >C_{16}-C_{34}	4500	5800	5300	85 000
TRH >C_{34}-C_{40}	6300	8100	7400	120 000

Note 1: HSLs for low density residential – Column 2 in Table A4 (CRC Care 2011).
Note 2: HSLs for high density residential – Column 3 in Table A4 (CRC Care 2011).
Note 3: HSLs for recreational/ open space – Column 4 in Table A4 (CRC Care 2011).
Note 4: HSLs for intrusive maintenance worker – Column 6 in Table A4 (CRC Care 2011).

Table 6.4: Ecological Screening Levels (mg/kg)

Substance	Urban Residential and Public Open Space (coarse soil)
Benzene	50
Toluene	85
Ethyl benzene	70
Xylenes	105
Benzo(a)pyrene	0.7
F1 (TRH C_6-C_{10})	180
F2 (TRH >C_{10}-C_{16})	120
F3 (TRH >C_{16}-C_{34})	300
F4 (TRH >C_{34}-C_{40})	2800

6.2 Groundwater Criteria

During the limited groundwater investigation undertaken by LeVert (2011), ANZECC/ARMCANZ (2000) trigger values with a 95% level of species protection for freshwater ecosystems and Dutch (2009) groundwater intervention values were adopted.

Subsequently, consultant (DLA 2014a) adopted ANZECC/ARMCANZ (2000) trigger values with a 90% level of species protection for freshwater ecosystems. Additionally, the consultant referenced NEPC

(2013) Groundwater Investigation Levels (GILs) for freshwater, NHMRC (2004) Australian drinking water guidelines and Dutch (2009) groundwater intervention values.

The groundwater criteria adopted by the consultant (GHD 2015) during the recent investigations in Stage 1 Area were based on the following:

- Freshwater trigger values with medium-low reliability (ANZECC/ARMCANZ 2000);
- Groundwater HSLs for vapour intrusion – HSL A&B (Low-high density residential) and HSL C (recreational) in sand (NEPC 2013);
- Freshwater GILs (NEPC 2013) applicable to slightly-moderately disturbed systems based on ANZECC/ARMCANZ (2000); and
- Federal quality guidelines (Environment Canada 2013).

A summary of groundwater investigation levels are presented in **Table 6.5**.

Table 6.5: Groundwater Criteria (µg/L)

Substance	Trigger Values for Slightly/Moderately Disturbed freshwater ecosystems (ANZECC/ARMCANZ 2000) (µg /L)[1]
Metals/metalloids	
Arsenic (as V)	13
Cadmium	0.2
Total Chromium	-
Copper	1.4
Lead	3.4
Mercury	-
Nickel	11
Zinc	8
BTEX	
Benzene	950
Toluene	180
Ethylbenzene	80
Xylene (o)	350
PAHs	
Naphthalene	16
Benzo(a)pyrene	0.1
Phenanthrene	0.6
Anthracene	0.01
PFC	
PFOS	0.006[2]
PFOA	-

Note 1: Trigger values for slightly-moderately disturbed freshwater eco systems (ANZECC/ARMCANZ 2000).
Note 2: Federal Environment Quality Guidelines (Environment Canada 2013).

Table 6.6: Groundwater HSLs for Vapour Intrusion (µg/L)

Substance	HSL A&B[1]			HSL C[2]		
	2 to <4 m	4 to <8 m	>8 m	2 to <4 m	4 to <8 m	>8 m
Benzene	800	800	900	NL	NL	NL
Toluene	NL	NL	NL	NL	NL	NL
Ethyl benzene	NL	NL	NL	NL	NL	NL
Xylenes	NL	NL	NL	NL	NL	NL
Naphthalene	NL	NL	NL	NL	NL	NL
F1 (TRH C_6-C_{10} – BTEX)	1000	1000	1000	NL	NL	NL
F2 (TRH >C_{10}-C_{16} – naphthalene)	1000	1000	1000	NL	NL	NL

Note 1: Groundwater HSLs for low-high density residential – Table 1A (4) – NEPC 2013. The consultant (GHD 2015) considered soil type as sand as a conservative measure based on presence of sand in fill material.
Note 2: Groundwater HSLs for recreational/ open space – Table 1A (4) – NEPC 2013.

6.3 Audit Findings

The soil criteria adopted by the consultant (GHD 2015) have been checked against, and were generally consistent with criteria endorsed by the EPA as applicable at the time of works undertaken.

Previous consultant, Levert (2011) adopted former NEPC (1999) soil assessment criteria applicable to low density residential land use. Additionally, the Levert (2011) adopted NSW EPA (1994) criteria which has since been rescinded by the EPA. Subsequently, during the DLA (2014a) investigation, the consultant adopted the revised NEPC (2013) criteria, however, the criteria used were based on commercial/industrial and recreational land use proposed at the time, which do not encompass all of the proposed uses of the site.

However, the auditor notes that during the most recent investigations (GHD 2015), the consultant adopted NEPC (2013) human health and ecological criteria applicable to the sensitive land uses related to the proposed development of the site as a hospital, consistent with guidance provided in EPA 2017. The consultant compared all soil and sediment analytical results including data presented in previous investigations (Levert 2011 and DLA 2014a) against criteria applicable to low and high density and open space land use.

The consultant (GHD 2015) adopted health screening levels for asbestos in accordance with NEPC (2013) and also took into consideration aesthetic issues (i.e., odours and discolouration) as part of the site assessment.

The groundwater investigation criteria adopted by the consultant (GHD 2015) have been checked against and were sourced from relevant NSW EPA endorsed guidelines, namely ANZECC/ARMCANZ 2000. The adopted criteria are considered appropriate for assessing the potential impacts to ecological receptors relevant to the site (i.e. fresh water in a semi-urban environment). The consultant also considered the most conservative groundwater HSLs for vapour intrusion for low-high density residential (HSL A&B) and recreational / open space (HSL C).

During the development of the conceptual site model, the consultant (GHD 2015) considered that human health receptors (off-site) including users of nearby water courses (Four Mile Creek) for recreational purposes and users of groundwater as potable resource, providing the existence of an exposure path. The consultant reported that groundwater extraction for recreational, irrigation, stock watering or drinking water use was possible, potentially through unregistered bores and groundwater discharge into low lying areas and waterways), however, noted that the brackish nature of water would preclude most beneficial uses.

Based on this, the auditor considers the exclusion of drinking water and recreational guidelines as part of the groundwater assessment, not to affect the conclusions regarding the groundwater quality or the potential migration of contaminants from the site.

Overall, the auditor considers that the soil and groundwater criteria adopted by the consultant were appropriate for assessing the nature and extent of contamination that may be present within the site.

7. Site Investigation Results

The auditor notes that previous intrusive investigations (Levert 2011 and DLA 2014a) were conducted across the entire former CSR mining/brickworks site while the most recent GHD (2015) investigation was conducted in the Stage 1 Development Area (i.e., the site). Data points from Levert 2011 and DLA 2014a relevant to the current site audit ('Stage 1 Development Area') have been listed below with results discussed in **Sections 7.2** and **7.3**.

- Area 1 – The consultant (DLA 2014a) completed five test pits (TP218, TP219, TP220, TP221 and TP222) in Area 1 and additionally included one surface water sample location (identified as 'Entry Dam').
- Area 2 – The consultant (Levert 2011) completed two test pits (TP71 and TP72), and one surface sample (S3). Soil investigation completed by consultant (DLA 2014a) included 12 testpits (TP125, TP126, TP127, TP128, TP129, TP130, TP131, TP132, TP133, TP201, TP244 and TP245); and two stockpile samples (SP4-1 and SP4-2). Groundwater investigation undertaken by consultant (DLA 2014a) included one sampling location (MW6).
- Area 3 – The consultant (Levert 2011) completed three test pits (TP42, TP69 and TP70). Subsequently, consultant (DLA 2014a) completed 17 test pits (TP134, TP135, TP193, TP195, TP196, TP197, TP200, TP205, TP206, TP207, TP208, TP209, TP210, TP211, TP212, TP235 and TP236).
- Area 4 – The consultant (Levert 2011) completed two test pits in this area (TP67 and TP68), while consultant (DLA 2014a) completed eight test pits (TP136, TP137, TP138, TP139, TP140, TP141, TP170 and TP171).

7.1 Field Observations

The subsurface profile as reported by the consultant (GHD 2015) is summarised below:

Area 1

- Fill encountered in Area 1 generally comprised silty clay/sandy silt and sand often with domestic waste, bricks and coal chitter to a maximum depth of 2.8 m bgs. Fill materials was underlain by clayey sand/sandy silt/sandy clay grading to the underlying bedrock comprising sandstone, siltstone, and shale with coal lenses up to 0.5 m thickness.
- Several large fragments of potential ACM was observed in the vicinity of HA402.

Area 2

- Fill encountered in Area 2 at smaller stockpiles generally comprised clay/clayey sand/silty clay with sand, gravel, cobbles with coal chitter, bricks, rubble, domestic waste and sandstone mostly near the northern boundary and along the noise berm at southern and western boundaries, to a maximum depth of 2.7 m bgs. Fill encountered at the larger stockpiles comprised sandy clay/ silty clay and clay to a maximum depth of 6.0 m bgs. The underlying natural material comprised sandstone, siltstone, and shale with coal lenses up to 0.5 m thickness.
- One fragment of potential ACM was observed on the surface at TP414.
- A slight sweet/organic odour was noted in near-surface soils at TP306, which was located in a grassed draining line in the northern portion of Area 2.

Area 3

- Fill encountered in Area 3 comprised sandy clay/silty clay with sand/gravel/cobbles with coal chitter, bricks, ceramic, rubble, domestic waste and sandstone to a maximum depth of 3.0 m

bgs. Anthropogenic waste was reported infrequently limited to a maximum depth of 1 m bgs at stockpiles. The underlying natural material comprised sandy/silty clay, clayey silt and clay grading to the underlying bedrock comprising claystone, sandstone, siltstone and shale with coal lenses up to 2.0 m thickness.

Area 4

- Fill encountered in Area 4 generally comprised sandy/silty clay with sand/gravel/cobbles with coal gravels and brick fragments to a maximum depth of 2.8 m bgs. The fill material was underlain by sandy/silty clay, clayey silt and clay, grading to the bedrock comprising sandstone, siltstone and shale.
- Several small fragments of potential ACM was observed in the vicinity of MW401.

The consultant (GHD 2017) reported that PACM was observed on the surface adjacent to waste building material stockpiles in the vicinity of MW401 in Area 4.

The consultant (GHD 2015) summarised the following during the groundwater monitoring event undertaken on 26 October 2015.

- Black oily sheen identified as shale oil was reported in the drilling water during the installation of MW401, MW402, MW403D, MW403S and MW404D. No hydrocarbon odours or light non-aqueous phase liquid were reported.
- The pH in shallow well MW403S was reported at 4.54, indicating acidic conditions. The pH in the deeper wells ranged from 5.93 (MW404D) to 11.96 (MW403D) with wells generally indicating slightly acidic to neutral conditions with the exception of MW403D.
- Electrical conductivity (EC) was reported at 11 128 µS/cm (saline) in shallow well MW 403S and ranged from 3867 µS/cm (MW400D) to 8973 µS/cm (MW402) in the deeper wells indicating brackish conditions.
- Dissolved oxygen (DO) was reported at 0.4 mg/L in shallow well MW403S indicating anoxic conditions and ranged from 0.33 mg/L (MW401) to 3.0 mg/L (404D) in the deeper wells indicating hypoxic conditions.
- Oxidation reduction potential (ORP) was reported at 219 mV in shallow well MW403S and ranged from 38 mV (MW401) to 78 mV (MW404D) generally indicating oxidising conditions with the exception of MW403 which indicated strongly reducing.

Surface water quality parameters were recorded by the consultant during sampling from a small pond in Area 1 (SW401), shallow wetlands in the northern portion of Area 3 (SW402) and from the large water body in the eastern portion of Area 2 (SW403) as follows:

- pH ranged from 6.22 (SW401) to 7.3 (SW402) indicating slightly acidic to neutral conditions;
- EC ranged from 233 µS/cm (SW401) to 1711 µS/cm (SW402) indicating fresh water.
- DO ranged from 0.96 mg/L (SW401) to 7.30 mg/L (SW402), indicating anoxic to oxic conditions.
- ORP ranged from 33 mV (SW402) to 130 mV (SW403), indicating slightly oxidising to oxidising conditions.

7.2 Soil Investigation Results

The consultant (GHD 2015) provided summary tables from the current and previous investigations (Levert 2011 and DLA 2014a) in addition to detailed laboratory reports and chain of custody documentation.

A summary of the analytical results in comparison to the adopted soil assessment criteria (as provided in **Section 6.1**), is provided in **Table 7.1**, as follows.

Table 7.1 Summary of Soil Analytical Results (mg/kg)

Substance	Minimum Concentration	Maximum Concentration	Exceedance to SAC
Metals			
Arsenic	<5	21	No exceedance
Barium	<10	1480	No exceedance
Cadmium	<1	0.4	No exceedance
Chromium (III+VI)	<2	34	No exceedance
Copper	<5	77	EIL exceedance (GHD 2015) **Area 2**: TP400_1.0-1.1 **Area 3**: TP450_2.3-2.5 (not highlighted in summary table), TP452_0.0-0.5 **Area 4**: TP434_0-0.1
Lead	<5	92	No exceedance
Manganese	<5	1210	No exceedance
Mercury	<0.1	0.3	No exceedance
Nickel	<2	68	EIL exceedances (GHD 2015) **Area 1**: TP417_0.0-0.1, **Area 2**: BHQ02 (triplicate of BH402_0.0-0.1), TP479_0.1-0.2, **Area 3**: TP448_1.6-1.8 (not highlighted in summary table), TP453_0.0-0.1 (not highlighted in summary table), TP462_0.2-0.4, **Area 4**: TP34_0.4-0.5
Zinc	<5	1330	EIL exceedances reported in 10 samples in **Area 1**, 36 samples in **Area 2**, 45 samples in **Area 3** and 7 samples in **Area 4** (GHD 2015).
TRH			
TRH C_6-C_{10}	<10	54	No exceedance
TRH >C_{10}-C_{16}	<50	170	No exceedance
F3 TRH >C_{16}-C_{34}	<100	870	ESL exceedances (GHD 2015) **Area 1**: HA407_0.0-0.3, TPQ068 and TP069 (duplicate and triplicate of TP417_1.9-2.0 respectively) **Area 2**: BH601_0.0-0.1, TPQ-004 (triplicate of TP306_0.2-0.4), TP402_0.2-0.3, TP405_0.3-0.5, TP407_0.5-0.7, TP478_0.1-03 **Area 3**: TP445_0.2-0.4, TP445_0.9-1.1, TP446_0.1-0.3, TP447_0.8-1.0, TPQ_38 (duplicate of TP447_0.8-1.0), TP448_0-0.2, TP449_1.0-1.2, TP450_0.1-0.3, TP450_0.5-0.7, TP450_2.3-2.5, TP452_0.0-0.5, TP477_0.2-0.4
F4 TRH >C_{34}-C_{40}	<100	280	No exceedance
F1 (TRH C_6-C_{10} – BTEX)	<10	36	No exceedance
F2 (TRH >C_{10}-C_{16} – naphthalene)	<50	250	HSL A&B (DLA 2014a) Area 2: TP245 and SP4 Area 3: TP 134, TP135, TP210 HSL A&B and ESL exceedances (GHD 2015) **Area 1**: TPQ069 (triplicate of TP417_1.9-2.0), **Area 2**: BH601_0.0-0.1, TPQ-004 (triplicate of TP306_0.2-0.4), TP402_0.2-0.3, TP478_0.1-0.3, **Area 3**:TP450_0.1-0.3, TP450_2.3-2.5, TP452_0.0-0.5.
BTEX			
Benzene	<0.1	2.2	HSL A&B exceedance reported at TP450_2.3-2.5 (**Area 3**)
Toluene	<0.1	4.6	No exceedance
Ethyl benzene	<0.1	2.1	No exceedance
Xylenes (total)	<0.3	9.8	No exceedance
PAHs			
Benzo(a)pyrene	<0.1	4.6	ESL exceedances reported at MW400D_0.0-0.05, MW400D_0.05-0.1, TP303_0.0-0.2 and TP401_0.5-0.7 (**Area 2**).
BaP TEQ	<0.2	6.2	HIL A, B and C criteria exceedance at TP401_0.5-0.7 (**Area 2**)
Naphthalene	<0.1	1.3	No exceedance
Total PAHs	<0.5	58	No exceedance

Substance	Minimum Concentration	Maximum Concentration	Exceedance to SAC
OCPs			
Hexachlorobenzene	<0.05	1.14	No exceedance
Other OCPs	<LOR		No exceedance
PFC			
PFOA	<0.0005	-	No exceedance
PFOS	<0.0005	0.0016	No exceedance
Other			
PCBs	<0.1	-	
Fluoride	60	460	No exceedance
Asbestos	No asbestos detected		No exceedance

7.3 Groundwater and Surface Water Investigation Results

The consultant (GHD 2015) provided summary tables (**Appendix F**) in addition to detailed laboratory reports and chain of custody documentation.

A summary of the groundwater and surface water analytical results in comparison to the adopted investigation levels (as provided in **Section 6.2**) is provided in **Table 7.2** as follows.

Table 7.2: Summary of Groundwater Analytical Results (µg/L)

Substance	Minimum Concentration	Maximum Concentration	Exceedance to GAC
Metals (filtered) (mg/L)			
Arsenic	<0.001	0.012	No exceedance
Cadmium	<0.0001	0.0054	MW403S
Chromium (III+VI)	<0.001	-	No exceedance
Copper	<0.001	0.006	No exceedance
Lead	<0.001	0.009	MW403S, SW401
Mercury	<0.0001	-	No exceedance
Nickel	0.002	0.152	MW403S, SW403, SWQ (duplicate of SW403), MW404D, MW404S, MW401, MW402
Zinc	<0.005	1.27	MW403S, SW401, MW400D, SW403, SWQ (duplicate of SW403), MW404D, MW404S, MW401, MW402
TRH			
TRH C_6-C_{10}	<20	-	No exceedance
TRH >C_{10}-C_{16}	<100	130	No exceedance
TRH >C_{16}-C_{34}	<100	5060	No exceedance
TRH >C_{34}-C_{40}	<100	3080	No exceedance
F1 (TRH C_6-C_{10} – BTEX)	<20	-	No exceedance
F2 (TRH >C_{10}-C_{16} – naphthalene)	<100	130	No exceedance
BTEX			
Benzene	<1	-	No exceedance
Toluene	<2	-	No exceedance
Ethyl benzene	<2	-	No exceedance
Xylenes (total)	<2	-	No exceedance
PAHs			
Naphthalene	<1	2.2	No exceedance
Benzo(a)pyrene	<0.5	1.6	MW404S
Phenanthrene	<1	11.6	MW404S
Fluoranthene	<1	2.4	MW404S
Total PAHs	<0.5	31.1	No exceedance
PFC			
PFOS	<0.00001	-	No exceedance
PFOA	<0.00001	-	No exceedance

7.4 Consultant's Interpretations and Conclusions

7.4.1 Soil

Based on a review of investigation results, the consultant (GHD 2015) provided the following discussion of results, conclusions and recommendations:

- The consultant noted that HSLs and ESLs provided in NEPC (2013) are based on petroleum hydrocarbons using a fuel composition typical of fresh petrol and diesel fuels, and may not be directly applicable to the type of hydrocarbons found at the site. However, the consultant noted that that derivation of site specific criteria is unwarranted if a conservative approach is used for assessment and management of soils.
- The concentrations of TRH compounds were reported exceeding adopted site assessment criteria (GHD 2015). Concentration of TRH F2 at TP417 (Area 1); BH601 TP306, TP402, TP478 (Area 2); and TP450, TP450, TP452 (Area 3) were reported exceeding HSL A&B and ESL criteria. Additionally, concentration of TRH F3 at HA407, TP417 (Area 1); BH601, TP306, TP402, TP405, TP407, TP478 (Area 2); and TP445, TP446, TP447, TP448, TP449, TP450, TP452, TP477 (Area 3) were reported exceeding ESL criteria.
- Based on the distribution of these locations, the consultant (GHD 2015) considered the contamination to predominantly result from the presence of fill or disturbed materials containing carbonaceous material, as well as in-situ carbonaceous material - as evidenced by samples from outcroppings of carbonaceous shale at the base of the quarry and beneath the stockpile in Area 3. Exceedances of ESLs were more widespread than HSLs due to more sensitive TRH F3 criteria which is not relevant to vapour risk, however, was considered to be generally associated with the same material.
- Other health based criteria exceedances were reported for benzene at TP450, considered to be associated with TRH F2 in the same material as noted above, and carcinogenic PAHs (BaP TEQ) at TP401 considered to correspond with stockpile SP4 which has been found to be contaminated during previous investigations. The consultant (GHD 2015) noted that there were a number of EIL exceedances for BaP, however, were not considered to be significant except for the instance noted above.
- ESL exceedances reported for zinc concentration in 98 locations across the site was considered to be associated with background concentrations while the copper and nickel exceedances were considered relatively minor and sufficiently isolated as to not present an unacceptable risk to human health and environment.
- The consultant completed 95% UCL calculation for TRH F2 and F3 concentrations in the large shale stockpile and adjacent outcropping in Area 3 which indicated that the material is not acceptable for the proposed development and should be managed accordingly (i.e. buried at depth>2 m).
- Based on the above results, from a contamination perspective, the consultant (GHD 2015) considered site assessment criteria exceedances to be minor and isolated and anticipated the fill materials to be acceptable for use in the proposed development, except for the large shale stockpile in Area 3 and the adjacent weathered shale outcropping extending into Area 2, and the small stockpile (potentially SP4 identified in DLA 2014a) at the northern end of Area 2.
- The consultant (GHD 2015) reported that anthropogenic wastes (including potential ACM) were not generally found to be present in the larger stockpiles of fill in Area 2 and Area 3, and are readily visually identifiable.

- No asbestos was detected in soil samples, however a potential ACM was identified on site in Areas 1, 2 and 4. The consultant (GHD 2015) noted that all visible asbestos is required to be removed prior to development works and further noted that there may be other areas containing ACM, given the nature of vegetation coverage and fill material across the site, especially within stockpiles containing building rubble.
- The consultant (GHD 2015) reported that many areas of fill on the site contain aesthetic issues, particularly including bricks, and to a lesser extent building and domestic waste which is unacceptable to be used on surface of site.

Based on the outcome of soil investigations carried out on site, the consultant (GHD 2015) recommended the following:

- Development works should include a soil management plan containing an asbestos management plan (AMP) and an unexpected find protocol to identify anthropogenic wastes, remove potential ACM prior to disturbance for appropriate disposal, and separate any wastes that are not acceptable for aesthetic or other reasons, for either management (eg. emplacement in deeper fill) or disposal.
- Consideration should be given to a conservative management approach through the burial of the carbonaceous material exceeding the assessment criteria to a depth of at least 2 m bgs.
- Materials presenting 'aesthetic issues' (bricks, building and domestic waste) may not be acceptable for use at the surface , but could be buried at depth or disposed of off-site to a licenced landfill facility prior to development. Where these materials are to be buried, the location and depth should be documented.

7.4.2 Groundwater

Based on the groundwater investigation results, the consultant (GHD 2015) provided the following discussions of results, conclusions and recommendations:

- Based on a review of water quality parameters measured in the field (as discussed in **Section 7.1**), the consultant noted that the unusually high pH and low ORP reported at MW403D (up-gradient well), was likely to represent the deeper aquifer. Up-gradient wells MW403D and MW403S reported a pH of 11.96 and 4.54 respectively. The consultant stated the cause for wide range of pH was unknown, however, noted that the acidic pH in the shallow well could be attributed to the presence of coal.
- The standing water levels (SWL) beneath the site ranged from 12 m bgs (6.54 m AHD) at MW400D to 5.3 m bgs (15.78 m AHD) at MW403D in the deeper aquifer. The SWL in the up-shallow well (MW403S) was reported as 2 m bgs (15.78 m AHD) MW403S. The groundwater flow was inferred to be to the northeast generally in accordance with local topography.
- Zinc and nickel concentrations were reported above GAC relatively consistently across the site in both shallow and deep wells. Cadmium, copper and lead concentrations were reported above GAC in shallow up-gradient well MW403S, while copper concentration was reported above GAC in up-gradient deep well. Further, these concentrations did not correspond with the elevated concentrations of the same metals reported in fill/natural soils. As such, the consultant concluded that the elevated metals concentrations in groundwater was likely associated with regional water quality.
- The consultant reported that the TRH detections and PAH concentrations exceeding GAC at MW404S was likely associated with the naturally occurring hydrocarbon present in the coal/shale bands. However, as TRH or PAH detections were not reported in any other well, the consultant concluded that persistence and distribution of shallow groundwater

contamination by hydrocarbon was unclear. As such, the consultant recommended additional shallow wells and further sampling of MW404S to be undertaken to delineate the source of the hydrocarbons in groundwater.

7.4.3 Surface water

Sample SW401 (Area 1) reported lead and zinc concentrations above respective GAC and additionally, TRH>C16-C34 was detected above laboratory LOR. The consultant considered these concentrations to be typical of urban runoff and not be indicative of any contamination to the surface water in the area.

Sample SW403 (Area 2) reported nickel and zinc concentrations exceeding freshwater GAC. No TRH, BTEX, PAH or PFC concentrations were detected above laboratory LOR. The zinc concentration was an order of magnitude higher than other surface water and groundwater samples which the consultant reported to be likely associated with the high turbidity in this water body.

Sample SW402 (Area 3) did not report any exceedances indicating the water body was not affected by any site contamination.

7.5 Audit Findings

The auditor noted that due to lack of availability of QA/QC information, previous investigation results (Levert 2011 and DLA 2014a) were considered indicative only for the purposes of this site audit. However, the auditor notes that previous investigation results (Levert 2011) and DLA (2014a) were comparable with the findings of GHD (2015). In general, a sufficient amount of investigations have been undertaken to achieve the stated purpose of the report (GHD 2015) and that the data presented by consultants (Levert 2011, DLA 2014a and GHD 2015) is of a suitable quality.

The consultant (GHD 2015) provided tables and a summary of results that were generally accurate and complete with the following exceptions:

- Sample locations from previous DLA (2014a) investigation relevant to the current site was noted incorrectly by the consultant (GHD 2015). Based on the consultant's figures, the auditor has summarised all data points relevant to current site above in **Section 7**.
- Laboratory certificates provided in GHD (2015) have indicated results for MW402_0.0-0.1 which the auditor has identified as BH402 based on summary tables provided by the consultant.
- Fluoride concentrations for samples TPQ-024 (160), TPQ-021 (220), TP491_0.1-0.3 (160), TP492_0.1-0.2 (220), TP492_1.0-1.2 (190), and TPQ-019 (180) have not been provided in the summary tables.
- Laboratory certificates provided in GHD (2015) have indicated one sample labelled as 450_0.1-0.3TP451_0.1-0.3, which the auditor has identified as 450_0.1-0.3 based on the summary table provided by the consultant.
- Laboratory certificates provided in GHD (2015) have indicated one sample labelled TP4495_0.1-0.2, which the auditor has identified as TP495_0.1-0.2.
- The following concentrations reported exceeding EIL criteria were not highlighted in the consultant's summary tables, however, the auditor has taken these into consideration in **Table 7.1** above.
    - Copper concentration at TP450_2.3-2.5;
    - Nickel concentration at TP448_1.6-1.8 and TP453_0.0-0.1; and
    - ZINC EIL exceedances were not highlighted in the following samples: HA400_0.5-0.7, HA408_0.0-0.1, BH402_0.9-1.0, SED401_0.0-0.1, SED402_0.1-0.2, SED403_0.0-1.0,

MW404S_0.4-0.5, MWQ08 (duplicate of MW404S_0.4-0.5), MWQ09 (triplicate of MW404S_0.4-0.5), MW404S_0.9-1.0, TP450_2.3-2.5, TPQ062 (Duplicate of TP457_0-0.1), TP461_0.6-0.8, TP464_0.4-0.5, TPQ057 (duplicate of TP464_0.4-0.5), TP466_0.4-0.5

The auditor notes that the inconsistencies noted above are minor and do not affect the findings of this audit. For completeness, the auditor has reviewed the data and provided a complete summary in **Table 7.1** and **Table 7.2** against the adopted soil assessment criteria and groundwater investigation levels.

The site plans provided by the consultant (GHD 2015) were to scale and adequately identified the sampling locations relevant to the main site features such as boundaries and street frontages.

The laboratory procedures were generally appropriate for the identified potential contaminants of concern and the adopted site assessment criteria against which the results were compared.

The consultant (GHD 2015) provided an assessment of aesthetic conditions for both fill materials at the site, taking into consideration odours, staining and presence of anthropogenic material including asbestos. The results were incorporated into consideration of the proposed remedial strategy (**Section 8**) and are considered appropriate for the purposes of this site audit.

The consultants addressed both the potential and actual migration of the identified contaminants through an assessment of groundwater. GHD (2015) investigation identified elevated levels of metals (including cadmium, copper, lead, nickel and zinc) in groundwater. The consultant considered that the elevated levels of metals were most likely attributed to regional groundwater conditions rather than onsite activities. The consultant (GHD 2015) noted that further assessment of shallow groundwater should be considered if site redevelopment is likely to encounter or disturb hydrocarbon contaminants as detected at MW404S.

The conclusions reached by the consultant (GHD 2015) in relation to soil and groundwater contamination issues are considered generally appropriate and meet the requirements of the site audit. However, further assessment of leachate potential is required to be undertaken where fill materials not originating from the site are proposed to be retained on site, in order to confirm their suitability. Additional sampling is also required to adequately conduct a waste classification for materials requiring off-site disposal. No significant changes were reported by the consultant (GHD 2017) in comparison to site conditions reported in GHD (2015). Overall, the consultant (GHD 2015 and GHD 2017) is considered to have obtained and reported results in a manner which enables conclusions to be drawn regarding the need for remediation (**Section 8)** and therefore meets the requirements of the site audit.

8. Remediation and Validation Requirements

8.1 Remediation Objective

The consultant (GHD 2016) reported the site was proposed for redevelopment as a health care facility comprising long term care (hospitals, child care, aged facilities, and hospices), commercial/industrial land use (training facilities, administration and ancillary buildings) and open spaces (gardens, play areas).

The consultant reported the objectives of the RAP (GHD 2016) are to provide a description of the proposed contamination management and remediation programs, procedures and standards which will be followed during the course of the project, to ensure the successful management or remediation of contamination at the site and consequently the protection of the environment and human health so that the site can be made suitable for the landuses nominated above through the implementation of the RAP.

The objectives of the RAP (GHD 2016) are presented below:

- Set soil management and remediation goals so that the site can be made suitable for the nominated land uses, and will pose no unacceptable risk to human health or the environment under the proposed uses;
- Evaluate the range of management or remediation options available to address the existing site contamination issues, and thereby reduce risks to acceptable levels;
- Establish a framework for interim management of the site prior to the commencement of development;
- Document the preferred contamination management or remediation techniques and procedures;
- Establish the various safeguards required to complete the contamination management or remediation work in a safe and environmentally acceptable manner;
- Identify the necessary approvals and licences required by regulatory authorities in order to enable the remediation works to proceed; and
- Enable the site to be certified by an independent accredited site auditor as suitable for the proposed health services facility, subject to the remediation/management of the site in accordance with the RAP.

8.2 Remediation Options

The consultant (GHD 2016) reported, in accordance with EPA 2017 and NEPC 2013, the following preferred options for remediation and/or management of contaminated land, in order of preference:

- On-site treatment of the contamination so that it is destroyed or the associated risk is reduced to an acceptable level.
- Off-site treatment of excavated soil, so that the contamination is destroyed or the associated risk is reduced to an acceptable level, after which soil is returned to the site.
- Consolidation and isolation of the soil on site by containment with a properly designed barrier.
- Removal of contaminated material to an approved site or facility, followed, where necessary, by replacement with appropriate material.

- Where the assessment indicates remediation would have no net environmental benefit or would have a net adverse environmental effect, implementation of an appropriate management strategy.

The consultant (GHD 2016) reported other options consistent with NEPC (2013) guidance could include the following:

- Adopting a less sensitive land use to minimise the need for remedial works, which may include partial remediation.
- Leaving contaminated material in-situ providing there is no immediate danger to the environment or community and the site has appropriate management controls in place.

8.3 Preferred Remediation/Management Approach

The consultant (GHD 2016) reported that based on the conceptual design plans (**Appendix C**) and geotechnical requirements, significant earthworks (including excavation, relocation/importation and compaction of material) are required to achieve the final landform required for the proposed development.

Based on the nature and extent of identified contamination (primarily TRH, PAH, ACM and aesthetic impacts) and the proposed redevelopment of the site, the following remediation strategy was presented:

- Physical removal and disposal of asbestos-containing materials that may be disturbed by the site works is the preferred initial remediation strategy and is consistent with regulatory requirements for ACM. The consultant reported that CSR is responsible for the removal of any identified areas of ACM prior to commencement of bulk excavations. Any further remediation of ACM will be limited to unexpected finds as discussed in **Section 8.5.11**.
- Visual screening and segregation of unacceptable materials (foreign inclusions, aesthetic impacts, ACM, hydrocarbon contaminated materials, potentially combustible materials) to address contamination impacts within stockpiles and across the general site area.
- Capping and containment as a conservative soil management option for segregated materials (as above) where contamination will not be subject to exposure under normal foreseeable use of the site (eg. burial at depths greater than 2 m below design structure levels or beneath permanent infrastructure as part of the redevelopment).
- Re-use of uncontaminated materials (VENM, screened overburden and fill) for bulk fill.

8.4 Remediation Extent

Based on the investigation results presented in GHD (2015), the remediation / contamination management required in Areas 1-4 were as follows:

<u>Area 1</u>

- Remediation works required involve removal of ACM impacts associated with illegally dumped materials; segregation and disposal or management of waste materials presenting aesthetic impacts; and management of TRH impacts (including potential combustibility) associated with carbonaceous materials identified in the noise berm through burial or capping under hardstand.
- Lateral extent of remediation included fill materials impacts up to 2.8 m deep and TRH impacts in stockpiles up to 2.0 m deep.

<u>Area 2</u>

- Remediation works required included segregation and disposal or management of waste materials presenting aesthetic impacts and selective hot spot removal of ACM identified at one location; and remediation of TRH and BaP impacts in the northwest corner and associated with carbonaceous materials (stockpiles and outcrops) and impacts within SP4 through burial or capping under hardstand.
- Extent of remediation included fill materials in large stockpiles and pushed up material recorded up to depths of 6.0 m and TRH and BaP impacts in disturbed carbonaceous materials to 0.7 m deep.

Area 3

- Remediation works required included segregation and disposal or management of waste materials presenting aesthetic impacts; and remediation of TRH and benzene impacts in the large shale stockpile, adjoining fill areas and outcrops through burial at depth or capping under hardstand.
- Extent of remediation required included fill materials recorded up to a depth of 3.0 m and TRH and benzene impacts at the base of a carbonaceous materials stockpile at a depth of 2.5 m.

Area 4

- Remediation works required included removal of ACM impacts associated with several stockpiles; and segregation and disposal or management of waste materials presenting aesthetic impacts.
- Extent of remediation required included fill recorded up to a depth of 2.8 m.

8.5 Remediation Activities

8.5.1 Work Plans and Licences

The consultant (GHD 2016) detailed the preparatory works required to be undertaken at the site prior to the commencement of any site remediation works including the following:

- A Detailed Work Plan must be prepared prior to commencement of remediation for review by site auditor including:
    - Work Health and Safety Plan (WHSP)
    - Environmental Management Plan (EMP)
    - Asbestos Management Plan (AMP)
    - Emergency Response Procedures.
- Consent from relevant approving authority to undertake remediation works, Insurance certificates and WorkCover notifications must be obtained prior to commencement of remediation works.
- The consultant reported that the remediation works were currently deemed as 'Category 2' while noting that the remediation work is considered ancillary to the proposed development of the site for a health services facility. As the proposed redevelopment works will require development consent with associated conditions, it is considered unlikely that any separate approvals would be required for the remediation/soil management. The consultant noted that if the remediation work is treated as category 2 remediation work, notice must be given to Maitland City Council at least 30 days prior to the commencement of the work, in accordance with clause 16 of SEPP 55. Regardless of category, a notice of completion of the

remediation work must be given to Council within 30 days after completion of the work, in accordance with clauses 17 and 18 of SEPP 55.

8.5.2 Site Establishment and Ground Preparation

The consultant (GHD 2016) detailed that preparatory works required to be undertaken at the site prior to the commencement of site remediation will be outlined in the Detailed Work Plan and will include:

- Site access to be controlled with only authorised personnel and vehicles permitted and appropriate signage and safety induction required;
- Appropriate plant maintenance and cleaning activities required to be undertaken to ensure all vehicles leaving the site are free of any contaminated material;
- Appropriate traffic control measures required to ensure site safety; and
- Appropriate environmental controls required to be installed and maintained consistent with the EMP to be prepared for the site.
- Vegetation clearance to be undertaken with care to avoid disturbance and spreading of contaminated materials, particularly potential ACM. An appropriately trained spotter will supervise all vegetation clearance to ensure these requirements are met. The unexpected finds protocol will be implemented if any contamination is observed during vegetation clearance.

8.5.3 Asbestos Management

The consultant (GHD 2016) reported the AMP to be prepared for the site is required to be meet the requirements stipulated in WHS (2011) and relevant Codes of Practice and should be consistent with the following:

- Asbestos materials present on the land surface and included in wastes such as demolition materials must be removed prior to disturbance during proposed site work activities.
- A licensed contractor should conduct a clearance following removal of identified areas of ACM to be followed by validation by environmental consultant. Clearance/validation documentation should be reviewed and inspection of surface materials in areas where ACM was previously identified should be completed with any observed fragments to be handpicked, as required, by a licensed asbestos removal contractor (if >10 m^2) or by a competent person in consultation with the Environmental Consultant.

The consultant (GHD 2016) provided the following procedure in relation to hand picking of ACM:

- If ACM is identified/collected during hand picking, the location and weights of asbestos should be recorded.
- Hand picking should consist of at least two passes of the picking area made with 900 direction change between each and using a grid pattern. If fragments are partially buried, surface raking of the top 100 mm of soil should be undertaken to disturb the subsurface soils and remove any partially buried fragments.
- ACM should not be further damaged or distributed by the process.
- Percent ACM contamination may be calculated using 1 cm as soil depth for hand picking.
- A final visual inspection should not detect surface ACM.
- The affected areas should be validated to confirm the removal of the ACM by visual and mechanical screening.

- Any asbestos materials found and recovered will be handled in accordance with *How to Safely Remove Asbestos – Code of Practice*, Safe Work Australia 2011 (approved under Section 274 of the Work Health and Safety Act 2011), classified in accordance with the NSW EPA Waste Classification Guidelines, Part 1: Classifying Waste (NSW EPA 2014), and disposed of offsite to a facility licenced to receive asbestos waste.

The consultant (GHD 2016) noted that should extensive surface or buried ACM be identified during excavation of stockpiles or surface materials, which cannot be feasibly removed by handpicking, these materials may be addressed by management of the ACM impacts through excavation and burial or capping under hardstand as per the procedure detailed in **Section 8.5.5** below.

8.5.4 Bulk Excavations

The consultant (GHD 2016) reported that proposed redevelopment of the site comprises bulk excavation and reuse of stockpiled overburden materials and sub surface materials that may contain low impact contamination (aesthetic impacts, ACM and carbonaceous material). The consultant (GHD 2016) identified the following tasks in relation to bulk earthworks. The consultant (GHD 2016) reported that bulk earthworks will be undertaken in accordance with the Detailed Work Plan and EMP and nominated responsible personnel for the tasks identified below:

- Locate areas designated for bulk earthworks and assess the risk of disturbance of any identified contamination in accordance with the material re-use schedule to be prepared for the site.
- Vegetation removal (**Section 8.5.2**).
- Visual inspection of exposed surface for potential ACM and foreign materials.
- Visual screening for potentially contaminated material during excavation/movement of stockpiles, surface and sub surface materials.
- Segregation and stockpiling or direct re-use of different waste streams based on visual assessment.
- Characterisation of stockpiled material for management on site (burial/capping) or to enable waste classification for off-site disposal.
- Use of suitable material in designated areas as appropriate for the development ensuring burial at depths greater than 2 m below design structure levels, or capping under proposed hard stand.
- Transport contaminated material by licensed waste transporter, to an appropriately licensed site for disposal or to an approved recycling facility where appropriate.
- Final design surfaces including topsoiling and revegetation as required.

The Detailed Work Plan should include the following in relation to bulk excavations:

- Definition of the boundaries of the areas to be disturbed (excavated) and expected depths (including liaison with the environmental consultant where required).
- Methods for excavation and stockpiling including selective excavations should different materials be encountered.
- Designated areas and depths for placing (i.e. for immediate re-use) or stockpiling excavated materials.
- Plans for surface run-off protection measures around the immediate area in order to prevent surface waters running into or out of the disturbed areas (also to be included in EMP).

- Backfill and compaction requirements.
- Material tracking control covering all stages of the works including excavation, stockpiling and backfilling to include:
    - Minimisation of mixing unless specifically required or approved.
    - A register of material movements (source area, material characteristics / description, stockpile identification, the volume of material, the destination (including on-site locations for intermediate movement), the date of any movements, authorisation details).
- Material transport control.

8.5.5 On-site Retention of Material

8.5.5.1 Material Re-use Schedule

Material excavation and re-use will be detailed in the Material Re-use Schedule which will include the following:

- Burial of problematic materials (eg. contamination, potentially combustible or aesthetic impacts) at depths greater than 2 m below design structure levels (including basement footings or subsurface infrastructure invert levels) to minimise the disturbance of such materials during redevelopment of the site. Consideration should also be given to avoiding areas that will require deep piles or other excavation extending more than 2 m below the design levels.
- Problematic materials encountered during later stages of the development could be contained in shallower fill beneath areas of pavement provided these areas are unlikely to be disturbed.
- In-situ native soils (to be excavated for design levels) and stockpiles of ripped sandstone material should be reserved for the upper layers of the development.

8.5.5.2 Visual Screening and Segregation

The consultant (GHD 2016) noted that visual screening can be applied to the segregation of stockpiles to detect ACM, foreign materials and potentially combustible materials. Procedure relevant to ACM was related to minor bonded ACM impact and not fibre generating material. The general methodology was described as follows:

- May be preceded by hand picking of visual ACM impacts if appropriate.
- Excavation works should be supervised by a competent person and any indication of building or demolition wastes, aesthetic impacts (coal chitter, rubbish) or combustible materials noted and selected materials segregated as required.
- Visual inspection and validation sampling (if required) will determine the suitability of the materials for re-use, placement under the required capping area or the requirement for disposal off Site.
- Materials should be segregated into specific stockpiles (or directed to agreed fill areas) according to the material re-use schedule and decision process for re-use or disposal.
- Impacted soils should not be mixed with other soils and impacted materials shall not be used for final surface levels in sensitive areas of the development.
- Final visual inspection of the screened materials should not detect ACM or aesthetic impacts.

Should ACM impacts be identified during the screening steps the following procedure should be followed:

- Soils should be pre-wet and the ongoing screening procedure subject to dust/fibre control and monitoring measures as outlined in the AMP.
- If suspect materials are identified, a detailed inspection should be undertaken with a subsample of the materials spread out over a contrasting surface (black plastic) for inspection for ACM.
- The materials should be segregated into stockpiles for burial at depth, capping on site under hardstand or disposal off site.

8.5.5.3 Capping and Containment

Capping and containment is proposed to be used in appropriate areas in compliance with DEC 2006 and ANZECC 1999 *Guidelines for the Assessment of On-site Containment of Contaminated Soils*, with the following considerations:

- Long-term stability of the capping system will be maximised from an engineering perspective) and leachate formation will be minimised, where applicable.
- Containment will not be undertaken in any areas where structures would subsequently be built that may result in a risk of harm to public health or the environment.
- Notification and enforcement mechanisms will be used to ensure that the containment areas are protected from any unintentional or uncontrolled disturbance that could breach the integrity of the physical barrier, such as placing a covenant on the property title and a notation on the s.149 certificate. The containment areas will be subject to a long-term site management plan (**Section 8.5.9**).

The consultant (GHD 2016) reported that the method of capping and containment works will be undertaken as follows:

- Designated containment or capping areas/voids are to be excavated to the required depth (as per detailed design plans and material re-use schedule to be developed as part of final design).
- Placement of segregated materials to be contained/capped within the designated areas, minimising disturbance to surrounding areas as far as reasonably practicable.
- Placement of uncontaminated capping material (minimum thickness 0.5 m, or greater in areas where deep rooted landscaping or underground services are proposed) to physically separate sensitive receptors from the contained materials. Where capping thickness is less than 2 m, a high visibility marker layer will be used. Surface paving (asphalt or concrete) over a gravel base may provide an equivalent barrier.
- To minimise the potential for surface water infiltration, the final design and location of the containment areas will need to be either located away from surface water sources or, the redevelopment should be engineered to divert any up gradient surface water sources away from the containment area.
- Finished levels of the capping layer are to be designed to encourage drainage of surface water away from the containment area. Erosion of the cap surface layer will also require control (potentially through revegetation or sealing of the finished surface).
- A Construction Quality Assurance (CQA) plan should be prepared to verify and document appropriate implementation of the RAP and final design documentation.

8.5.5.4 Potentially combustible materials

The consultant (GHD 2016) reported that provided the potentially combustible materials (generally carbonaceous fill, stockpiles or outcroppings) identified on site were deemed suitable for re-use on site from a contamination viewpoint. Placement of any combustible material on-site will be recorded on the Long Term Site Management Plan (LTSMP) to be prepared for the site.

8.5.5.5 Potential Leachability

The consultant (GHD 2016) reported that a program of assessment of leachability (by means of Australian Standard Leaching Procedure (ASLP) or equivalent testing) will be developed as part of the final design and be incorporated into the material re-use schedule particularly to be placed below existing or future groundwater levels or in areas where infiltration or surface water precipitation is likely to occur.

8.5.6 Site Re-instatement

The consultant (GHD 2016) reported that following completion of excavation works, the site will be reinstated by re-contouring the surface, backfilling with suitable site material and/or imported fill in accordance with final design requirements.

8.5.7 Imported Fill

The consultant (GHD 2016) noted that cut and fill plan for the final design will aim to minimise the importation of significant volume of material. Any imported fill should comply with Virgin Excavated Natural Material (VENM) criteria or subject to a Resource Recovery Order.

8.5.8 Interim Site Management

The consultant (GHD 2016) reported that interim management was required at the site to minimise any changes to site characteristics until the commencement of site remediation activities. Site should remain securely fenced and an assessment should be made in the event of any incidents relating to contamination, to determine immediate remediation or adequate management until commencement of site remediation/redevelopment works.

8.5.9 Long Term Site Management Plan

The consultant (GHD 2016) reported that a Long Term Site Management Plan (LTSMP) will be prepared to record the placement of any contaminated and combustible material on site, describing the following:

- Nature and location of contamination remaining on-site;
- The objectives of the plan;
- Method of management of contaminants;
- Individual responsibilities for the plan's implementation;
- Time frames that actions specified in the plan will take place; and
- Procedures to be used in the event that this should be disturbed.

8.6 Remediation Works Contingency Plan

The consultant (GHD 2016) provided a contingency plan which outlines procedures for the identification and management of unexpected issues or events that may arise during the remediation works and corresponding corrective actions. It contains provisions for the following events:

- Previously unidentified types and/or greater volumes of contamination being identified;
- Identification of further ACM; and

- Unacceptable environmental impacts as a result of remediation activities;

The consultant (GHD 2016) provided a preliminary Unexpected Finds Protocol (UFP) to be implemented in the event of such issues and further noted that a site specific Emergency Response Plan should be prepared to precede UFP in the event of an immediate hazard.

8.7 Remediation Works Environmental Management Plan

The consultant (GHD 2016) reported that the contractor's EMP should be developed on the basis of the following environmental protection and pollution control measures applicable to site remediation works as well as development works:

- Interim controls;
- Hours of Operation;
- Site contact details;
- Heritage/ecological issues;
- Soil and Water Management;
- Noise and Vibration;
- Dust and particulate control;
- Odour control;
- Air quality monitoring; and
- Traffic movement and management.

8.7.1 Interim Controls

The consultant (GHD 2016) reported that permanent site fences are required to be placed to prevent unauthorised access. Additionally, appropriate silt and sediment controls are required to prevent erosion and runoff.

8.7.2 Soil and water Management

The consultant (GHD 2016) noted that a detailed sediment and water management plan will likely be required as part of consent conditions for the proposed development. A summary of relevant soil and groundwater management measures was provided as follows:

- Surface runoff control – measures may include diversion drains, silt fences, sumps and pumping systems to prevent runoff entering or leaving excavation areas and runoff/suspended solids entering or leaving stockpile areas;
- Stockpiles – Stockpiles to be placed away from footpaths/roads, drainage lines, gutters, stormwater pits or inlets. Stockpiles likely to generate dust/odours should be covered. Stockpiles of any contaminated soils should be stored in a secure area. Segregated contaminated material, particularly with foreign material/ ACM are preferably to be stored in skip bins prior to disposal where feasible.
- Vehicle access – Plant and truck movement will be restricted to operation hours and necessary controls should be placed to prevent material being tracked off-site onto roads including wheel washing, sediment barriers, sweeping and shovelling.
- Excavation pump-out – If required, disposal of ponded water should be undertaken by a liquid waste transporter. Further assessment by the environmental consultant is required if discharge to stormwater is considered. No surface water runoff or ponded water is

permitted to be discharged to the surrounding environment with the exception of dust suppression following approval from Environmental consultant.

- Sediment dams – Sediment dams may be constructed and/or existing voids and ponds on the site or adjoining areas of the overall development area may be utilised for detention of stormwater runoff. Details shall be prepared and approved as part of the detailed soil and water management plan, including design flows, sampling and discharge requirements.
- Landscaping – Existing vegetation should be protected unless removal is required to undertake remedial works. Vegetation designated for protection shall be fenced to prevent any disturbance during remedial activities.

8.7.3 Noise and Vibration

The consultant (GHD 2016) reported that all contractors will be required to comply with NSW EPA and local council standards to minimise noise generation. The consultant (GHD 2016) further noted that use of any plant/machinery should not cause vibrations that can be felt or capable of being measured from any off-site premises.

8.7.4 Air Monitoring

The consultant (GHD 2016) reported that dust control measures (e.g. perimeter dust screens, covering of stockpiles and truckloads and dust suppression using water) should be specified in the contractor's detailed work plan and EMP.

The consultant (GHD 2016) noted that site odours were unlikely considering the nature of identified contamination, however noted that no odours should be detectable at the site boundary. The consultant noted that odour control measures (e.g. overing stockpiles, use of fine mist sprays, odour mitigating agents and minimising exhaust emissions) should be specified in the contractor's detailed work plan and EMP.

The consultant (GHD 2016) reported that airborne fibre monitoring for asbestos should be conducted in accordance with the site AMP and WHS Regulation (2011) during disturbance of materials potentially contaminated with asbestos, where emission of fibres is likely to occur or as otherwise required by the WHS Regulation (2011) or relevant Codes of Practice. Further, the consultant (GHD 2016) reported that asbestos air monitoring requirements and action levels will be specified in the AMP to be prepared for the site.

8.8 Health and Safety Plan

The consultant (GHD 2016) reported that in compliance with NSW Occupational Health and Safety Act (2000) and associated regulations and codes of practice, a site specific Work Health and Safety (WH&S Plan) will be implemented during the remediation works and should consider the following:

- Induction of personnel;
- Amenities;
- Hazard locations and identification;
- Description of exposure pathways and personnel protection equipment (PPE) requirements;
- Location of all underground/aboveground services;
- Work practice procedures within the designated contaminated zones;
- Monitoring protocols to identify potentially hazardous practice;
- Training and licensing;
- Emergency response information and procedures; and

- Incident reporting.

8.9 Validation Acceptance Criteria

The consultant (GHD 2016) noted that the site development footprint was currently undetermined, as such, extent of soils subject to exposure was unknown. The consultant noted that the most sensitive assessment criteria will be compared with the concentrations of any contamination identified at the site. If these are exceeded, the specific land use and exposure scenarios relevant to the area and depth at which the subject material is located will be examined, and the concentrations compared with the appropriate criteria for those circumstances. If the relevant criteria are exceeded, the material will be managed or remediated in accordance with the RAP. The consultant noted that this process of assessment will take place during final design.

8.9.1 Soil

The consultant reported that for the purposes of the RAP, the soil validation criteria would comprise the following:

- HIL/HSLs for exposure setting values A, B and C (NEPC 2013).
- HSLs for Intrusive Maintenance Workers (CRC Care 2011);
- HSLs for Direct Contact– HSL A, B and C, and intrusive maintenance worker (CRC Care 2011);
- Management Limits for TPH fractions in soil;
- US EPA RSLs to be adopted in the absence of HIL/HSL guideline value; and
- Site specific EILs and ESLs for urban residential and public open space land scenario.

The consultant also reported that aesthetic considerations would be taken into account during site remediation/validation. The referenced soil criteria are provided above in **Table 6.1** (**Section 6.1**).

8.9.2 Groundwater and Surface Water

The consultant reported that further assessment/remediation of surface water and groundwater was not proposed, noted that unexpected contamination identified during redevelopment works may warrant further assessment. The consultant (GHD 2016) referenced NEPC 2013 Groundwater Assessment criteria based on ANZECC 2000, NHMRC 2011 and GMRRW (2008) as framework for risk-based assessment of groundwater contamination.

8.10 Validation Plan

The consultant (GHD 2016) presented a validation plan to determine if the remediation goals stipulated in the RAP have been met.

8.10.1 Validation Sampling, Analytical and Quality Plan

8.10.1.1 Validation Approach

The consultant reported that aesthetic criteria (**Section 6.1**) and visual observations will be used to guide excavations in the nominated remediation areas under the supervision of the environmental consultant. The consultant referred to human health and environmental based validation criteria for contaminants identified at the site (**Section 8.9**) to be used to demonstrate successful remediation.

8.10.1.2 Validation Sampling Methodology

The consultant (GHD 2016) reported that all validation samples collected will be placed in appropriately labelled sample containers and a detailed sample register will be maintained where sample number, date sampled, location, depth interval and field observations are recorded.

The consultant (GHD 2016) reported the following procedures for validation following asbestos removal:

- Validation of areas where ACM materials have been removed will be undertaken visually, by a combination of inspection and raking by a competent person who is experienced in the identification of asbestos (occupational hygienist).
- Areas where no ACM is found will be considered affectively free of asbestos and a confirmatory sample will be collected in accordance with NEPC (2013) and WA DoH (2009) guidance.
- Sampling rate where ACM is removed from large excavation areas will be based on the rate of twice the minimum grid sampling guidelines provided in EPA (1995) Sampling Design Guidelines.

The consultant's (GHD 2016) nominated validation procedure for excavations is summarised as follows:

- Validation sampling of excavations will only be required if excavated surfaces may be subject to exposure following completion of the development, or where validation of unexpected finds is required.
- Validation sampling from excavations will generally involve collecting one sample per 25 m^2 from the base of each excavation (minimum one base sample from any single excavation) and one sample per 5 m of wall (minimum one sample for each excavation wall).
- Samples of surface soils (0.0-0.2 m) will be taken from each side of the excavation to validate the horizontal extent of remediation, with samples also taken from mid-depth (or any visually impacted soil strata) if the excavation depth exceeds 0.5 m. Aesthetic issues (re odours, debris) will be taken into account in the validation.
- In the areas of aesthetically impacted soils, validation will be undertaken by visual assessment of the resultant excavations.
- Soil samples collected for validation purposes will be analysed for the particular contaminants previously identified as exceeding (or potentially exceeding) assessment criteria in the area of the excavation.

The consultant (GHD 2016) outlined a procedure for validation materials prior to re-use on site:

- If required, validation sampling for ACM will be undertaken by the Environmental Consultant to demonstrate that materials have been appropriately screened of asbestos contamination and anthropogenic inclusions to a standard that is suitable for proposed placement either at the surface or in sensitive areas of the site. Sampling and analysis for other potential contaminants will also be undertaken if required.
- Validation sampling for asbestos from screened stockpile materials or other similar materials will involve a final detailed visual inspection of the screened materials that should not detect ACM. Where ACM is encountered, percentage contamination will be calculated using the weight of ACM found for a particular area or volume. The recommended sampling rate for known volumes of screened materials is one sample per 250 m^3 with a minimum of three samples collected from any one portion of the stockpile (equivalent to the stockpile sampling density from the ENM exemption 2012).
- Analysis will be for both ACM quantification and asbestos in soils (AF/FA) in accordance with the NEPM 1999. The consultant noted that exceedance of HSL A or HSL C criteria will not necessarily preclude placement of the materials, but may entail more stringent management requirements (including during movement/handling) if significant asbestos is encountered.

The consultant (GHD 2016) provided the following method for validation of excavated material/stockpiles for waste classification in accordance with NSW EPA (2014):

- Waste classification samples will be collected from any soil requiring off-site disposal to landfill at a rate of one sample per 25 m3 of material with a minimum of three samples per batch. For larger volumes of soil (>100 m3) sampling frequency may be reduced provided statistically representative classification can be achieved. Samples collected for waste classification purpose will be analysed for heavy metals (arsenic, cadmium, chromium, lead, mercury and nickel), TRH, PAH and asbestos.
- If required for classification purposes, representative soil samples will also be submitted for Toxicity Characteristic Leaching Procedure (TCLP) and the resultant leachate analysed for the relevant contaminants governing the waste classification.
- Any liquids within the excavations during the remediation works that require offsite disposal would be classified as liquid waste, to be disposed of to a facility licensed to accept / treat the liquid under the POEO Act 1997.

The consultant (GHD 2016) provided the following methodology for validation of imported fill:

- Any imported VENM fill shall be verified by a VENM certificate prepared by an appropriately qualified and experienced consultant, and the source and material as delivered shall be inspected by the Environmental Consultant to verify consistency with the VENM certificate.
- Where no supporting analytical results are available for imported VENM, a minimum of 3 samples from any particular fill source shall be analysed for TPH, BTEX, heavy metals, OCP/PCBs, PAHs and asbestos.
- Where necessary, non-VENM imported materials will be validated for suitability for use as fill material at an equivalent density to the requirements of EPA (2014) *The excavated natural material order (EPA 2014*a) minimum rate of 1 sample per 100 m^3, and at least 3 samples from any particular fill source, or at an equivalent density to the requirements of EPA (2014a). Samples will be analysed for TPH, BTEX, heavy metals, OCP/PCBs and PAHs concentrations against criteria provided in EPA (2014a) or Australian Standard relevant to the material and shall contain no detectable asbestos.

8.10.1.3 Quality Assurance and Quality Control (QA/QC)

The consultant (GHD 2016) reported that the data quality objectives (DQO) for the validation process were developed in accordance with the seven step process referred to in DEC (2006).

The consultant reported that both a field and laboratory QA/QC program will be conducted during the validation works.

The consultant reported the following standard field operating procedures will be implemented:

- Decontamination procedures
- Sample Identification procedures
- Requirements for soil bore logs
- Chain of custody requirements
- Sample duplicate frequency
- Field equipment calibration requirements

The consultant (GHD 2016) reported that validation samples will be collected directly from the sides and base of excavations, or by hand auger or from within relatively undisturbed soil recovered by the excavator bucket from the excavation. The consultant noted that validation samples will be screened using a PID where hydrocarbon contamination is expected.

The consultant (GHD 2016) reported that laboratory QA/QC will consist the following procedures:

- Analysis and reporting of laboratory duplicate samples
- Analysis and reporting of laboratory method blanks
- Analysis and reporting of laboratory control samples
- Analysis and reporting of laboratory matrix and surrogate spikes

8.10.2 Validation Report

The consultant (GHD 2016) reported that at the completion of the remediation and validation of the site, a Validation Report will be prepared summarising the works performed and the validation results demonstrating compliance with the objectives of the RAP.

8.11 Audit Findings

The consultant's (GHD 2016) nominated remediation objectives were appropriate and consistent with the proposed uses of the site.

The consultant (GHD 2016) considered a wide range of remediation and management options and adopted a strategy including screening and segregation of unacceptable material, capping and containment, where contamination will not be subject to exposure under normal foreseeable use of the site and re-use of uncontaminated material for bulk fill as appropriate. With consideration to the nature and extent of soil of the identified soil contamination, the auditor accepts the preferred remediation approach to be consistent with relevant NSW EPA guidance. Further, the auditor considers the remediation approach presented in GHD (2016) to be consistent with findings of the recent site condition inspection (GHD 2017).

The proposed validation assessment provided by the consultant is considered appropriate and in accordance with relevant guidelines.

The site management provisions appear to broadly control the potential impacts associated with the proposed remediation works, and appear adequately protective of both the remediation workforce and the surrounding environment (including the neighbouring community). The auditor also notes that the following documents should be prepared during the site redevelopment works, consistent with the RAP:

- Work Health and Safety Plan (WHSP) including emergency response procedures;
- Environmental Management Plan (EMP);
- Asbestos Management Plan (AMP);
- Materials Re-use Schedule;
- Contamination Finds Protocol;
- Capping Specification; and
- Construction QA Plan (CQAP).

As noted in the RAP (GHD 2016), a long term site environmental management plan (LTSEMP) will be required to record placement of any contaminated material on site. Additionally, considering, the extent of material movement indicated in the RAP and reliance on placing materials at depth to mitigate potential exposures, a material tracking plan is required to be prepared and reviewed by the auditor.

Overall, the adopted remediation approach presented in the RAP (GHD 2016) was reviewed by the auditor and found to be:

- Technically feasible.
- Environmentally justifiable given the nature and extent of the identified contamination.

- Consistent with relevant laws, policies and guidelines, since the works were undertaken in a manner which did not appear to result in any relevant regulatory measures being breached.

Upon successful completion of the remediation and validation activities, the consultant (GHD 2016) stated a validation report will be prepared. The auditor notes that the report will need to be prepared in accordance with the requirements of OEH 2011 and EPA 2017 and other relevant endorsed EPA guidelines.

The remediation strategy proposed for the site is considered appropriate for the site given the identified contamination issues, and able to make the site suitable for the proposed uses, subject to the following:

- All of the sub-plans required under the RAP should be reviewed and accepted by site auditor prior to commencement of remediation works;
- A Material Tracking Plan (MTP) is required to be reviewed and accepted by a site auditor prior to commencement of any remediation or civil works; and
- The validation report and long term environmental management plan (LTEMP) must be reviewed and accepted by a site auditor prior to occupation.

9. Evaluation of Landuse Suitability

In assessing the suitability of a site for an existing or proposed landuse in an urban context, the decision process for assessing urban redevelopment sites should be followed (Page 46 and 47, EPA 2017), as discussed in the following sections.

This audit was undertaken with the objective of independently reviewing the previous site investigation reports (GHD 2015) and reviewing and assessing the suitability of the RAP (GHD 2016) to determine if the land can be made suitable for the proposed landuse as a health care facility comprising long term care (hospitals, child care, aged facilities, hospices), commercial/industrial land use (training facilities, administration and ancillary buildings) and open spaces (gardens, play areas); through the implementation of the process outlined in the RAP (GHD 2016).

9.1 Reporting in accordance with EPA requirements

The documents provided by the consultant (GHD) have been checked against, and meet the requirements of OEH (2011). As such, the reporting of the site investigation process and the proposed remediation and validation process is considered to be appropriate and meets the requirements of this audit.

9.2 Aesthetic have been addressed

The consultant (GHD 2015 and GHD 2017) provided adequate consideration to odours, soil discolouration, domestic and demolition waste and other anthropogenic materials during the site investigation process and the proposed remediation/validation works.

The consultant (GHD 2016) proposed a remediation strategy that takes into consideration the site observations and analytical results obtained to date, and as such, the auditor notes any adverse contaminant odours posed by these materials, soil discolouration anthropogenic material are unlikely to impact the future uses of the site.

9.3 Soils have been assessed against the appropriate investigation levels

The site assessment criteria adopted by the consultant (GHD 2015) have been checked against and are generally consistent with, appropriate criteria endorsed by the EPA. The consultant adopted appropriate criteria considering the proposed sensitive land use as a hospital. The consultant noted that HSLs and ESLs provided in NEPC (2013) are based on petroleum hydrocarbons using a fuel composition typical of fresh petrol and diesel fuels, and may not be directly applicable to the type of hydrocarbons found at the site. However, the consultant noted that that derivation of site specific criteria is unwarranted if a conservative approach is used for assessment and management of soils. Additionally, the auditor notes that appropriate site validation criteria was presented by the consultant in the RAP (GHD 2016).

The consultant (GHD 2015) additionally completed a groundwater investigation to consider the potential for migration of contamination from soils to groundwater.

9.4 Groundwater has been assessed against appropriate investigation levels

The groundwater investigation criteria adopted by the consultant (GHD 2015) have been checked against and are generally consistent with, appropriate criteria endorsed by the EPA.

9.5 Background soil concentrations have been adequately addressed

The consultant (GHD 2015) generally sampled to depths which provided penetration into natural soils within the site to give an indication and representation of local natural soil profiles.

The chemical concentrations reported in soil samples from the natural soil profile were generally below the appropriate soil criteria with no background concentrations requiring specific remediation or management.

9.6 All impacts of chemical mixtures have been assessed

No issues relating to chemical mixtures in relation to identified contaminants of concern were identified. Hence, there was no requirement to give any further consideration to the impact of chemical mixtures.

9.7 Any potential ecological risks have been assessed

The consultant (GHD 2015) identified potential ecological risks relating to the identified contamination issues. TRH and BaP concentrations were reported exceeding ecological criteria, however, were considered to predominantly result from the presence of fill or disturbed materials containing carbonaceous material, as well as in-situ carbonaceous material. Widespread ecological exceedances relating to Zinc were also reported, which were considered as associated with background concentrations (GHD 2015). Further, copper and nickel concentrations reported exceeding ecological criteria were reported were considered relatively minor and sufficiently isolated as to not present an unacceptable risk to the environment. As such, the requirements of the site audit in relation to potential ecological risks have been met.

9.8 Site management strategy is appropriate

The previously identified contamination (primarily TRH, PAH, ACM and aesthetic impacts) require remediation/ management as outlined in the RAP (GHD 2016). The proposed remedial strategy subject to appropriate management (a long term EMP) included:

- Removal and disposal of asbestos-containing materials that may be disturbed by the site works prior to commencement of bulk excavations (with any further remediation of ACM to be limited to unexpected finds);
- Visual screening and segregation of unacceptable materials (foreign inclusions, aesthetic impacts, ACM, hydrocarbon contaminated materials, potentially combustible materials) to address contamination impacts within stockpiles and across the general site area;
- Capping and containment as a conservative soil management option for segregated materials (as above) where contamination will not be subject to exposure under normal foreseeable use of the site (eg. burial at depths greater than 2 m below design structure levels or beneath permanent infrastructure as part of the redevelopment); and
- Re-use of uncontaminated materials (VENM, screened overburden and fill) for bulk fill.

In accordance with the requirements of EPA 2017, the site management strategy outlined in the revised RAP (GHD 2016) is considered to be:

- Technically feasible;
- Environmentally justifiable given the nature and extent of the identified contamination; and
- Consistent with relevant laws, policies and guidelines.

On this basis, the auditor accepts that the proposed remediation, validation and long-term management strategy is appropriate and, if implemented appropriately, will make the site suitable for the proposed landuse as a health care facility comprising long term care (hospitals, child care, aged facilities, hospices), commercial/industrial land use (training facilities, administration and ancillary buildings) and open spaces (gardens, play areas).

9.9 Contaminant migration (actual or potential) has been addressed

The consultant (GHD 2015) addressed both the potential and actual migration of the identified contaminants of concern through an assessment of groundwater.

There were no reported concentrations of contaminants identified in groundwater which were considered to pose any unacceptable risks to any off-site human or ecological receptors. The

consultant (GHD 2016) noted that additional investigation of shallow groundwater maybe required if the hydrocarbon contamination is to be disturbed during the redevelopment works.

As such, the requirements of the site audit in relation to consideration of contaminant migration have been met.

10. Audit Summary Opinion

On the basis of the findings of the site audit, and subject to the limitations in **Section 11**, the following summary opinions are provided:

- The site assessment activities undertaken by GHD and proposed remediation and validation works are considered to have met the requirements of the *Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme* (3rd Edition) (EPA 2017).
- The site investigation activities identified ACM impacted material, carbonaceous material exceeding the assessment criteria and material presenting aesthetic issues (building and domestic waste) at the site which require remediation or management under the proposed uses.
- The site investigation activities also reported the presence of potentially combustible materials (generally carbonaceous fill, stockpiles or outcroppings), however, were deemed suitable for re-use on site from a contamination viewpoint. Prior to any potentially combustible materials being reused on site, a suitably qualified and experienced geotechnical engineer must certify that the materials are suitable to be reused. In the event that potentially combustible materials are deemed suitable for reuse, their placement should be recorded in the long term site management plan (LTSMP) to be prepared for the site.
- There were no levels of the identified contaminants of potential concern in groundwater which are considered not to require remediation or management under the proposed uses. There was no evidence of potential or actual migration of contaminants from the site which may result in unacceptable risks to surrounding human or ecological receptors.
- The RAP (GHD 2016) prepared for the site addressed the identified contamination issues as they relate to the proposed uses of the site. The remediation approach documented in the RAP was checked by the auditor and was found to be technically feasible, environmentally justifiable given the nature and extent of the identified contamination and consistent with relevant laws, policies and guidelines.
- The remediation strategy proposed for the site is considered appropriate for the site given the identified contamination issues, and able to make the site suitable for the proposed health care facility uses, commercial/industrial uses and parks/open space uses, subject to the following:
    - All of the sub-plans required under the RAP must be reviewed and accepted by site auditor prior to commencement of remediation works;
    - A Material Tracking Plan (MTP) is required to be reviewed and accepted by a site auditor prior to commencement of any remediation or civil works; and
    - The validation report and long term environmental management plan (LTEMP) must be reviewed and accepted by a site auditor prior to occupation.

11. Limitations

This audit was conducted with a reasonable level of scrutiny, care and diligence on behalf of the client for the purposes outlined in the Contaminated Land Management Act 1997. The data used to support the conclusions reached in this audit were obtained by other consultants and the limitations which apply to the consultant's report(s) apply equally to this audit report.

Every reasonable effort has been made to identify and obtain all relevant data, reports and other information that provide evidence about the condition of the site, and those that were held by the client and the client's consultants, or that were readily available. No liability can be accepted for unreported omissions, alterations or errors in the data collected and presented by other consultants. Accordingly, the data and information presented by others are taken and interpreted in good faith.

Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.

Limited sampling and laboratory analyses were undertaken as part of the investigations reviewed, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this audit are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G and the Site Auditor reserve the right to review the report in the context of the additional information, subject to meeting relevant guideline requirements imposed by the EPA.

Appendix A Guidelines made or approved by the EPA

Guidelines made or approved by the EPA (s.105 CLM Act 1997)

Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Paper No 4, 2000 (ANZECC/ARMCANZ 2000)

Australian Drinking Water Guidelines, National Health and Medical Research Council and Agriculture and Resource Management Council of Australia and New Zealand, 2011 (NHMRC/NRMMC 2011)

Composite Sampling, Lock, W. H., National Environmental Health Forum Monographs, Soil Series No.3, 1996, SA Health Commission, (NEHF 1996)

Contaminated Sites: Sampling Design Guidelines, NSW EPA, 1995 (EPA 1995)

Contaminated Sites: Guidelines for the Vertical Mixing of Soil on Former Broad-Acre Agricultural Land, NSW EPA, 1995 (EPA 1995b)

Contaminated Sites: Guidelines for the Assessment and Clean Up of Cattle Tick Dip Sites for Residential Purposes, NSW Agriculture and CMPS&F Environmental, February 1996 (NSW Agr. 1996)

Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites, NSW EPA, 1997 (EPA 1997, reprinted and updated 2011)

Contaminated Sites: Guidelines for Assessing Banana Plantation Sites, NSW EPA, 1997 (EPA 1997b)

Contaminated Sites: Guidelines for Assessing Former Orchards and Market Gardens, NSW EPA, 2005 (EPA 2005)

Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme (3rd Edition), NSW EPA, 2017 (EPA 2017)

Contaminated Sites: Guidelines for the Assessment and Management of Groundwater Contamination, NSW EPA, March 2007 (EPA 2007)

Contaminated Sites: Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997, NSW EPA, June 2009 (EPA 2009)

Environmental Health Risk Assessment: Guidelines for assessing human health risks from environmental hazards, Department of Health and Ageing and EnHealth Council, Commonwealth of Australia, June 2002 (EnHealth 2002)

National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013, National Environment Protection Council (NEPC 2013)

Appendix B Audit Correspondence

Sahani Gunatunge

From: Sahani Gunatunge
Sent: Monday, May 9, 2016 4:33 PM
To: Troy Harvey
Cc: Andrew Lau
Subject: Site Audit New Maitland Hospital Stage 1

Hi Troy,

In order to start the audit works, could you please provide a copy of the following consultant reports indicated in the audit scope:

- LeVert (2011), *Stage 2 Soil Investigation*, *CSR/PGH Maitland NSW.* LeVert, September 2011.
- Environmental Auditors (2011), *Preliminary Contamination Assessment, PGH Site, Metford NSW.* Environmental Auditors, February 2011.

Kind Regards

Sahani Gunatunge | Environmental Engineer / Auditor Assistant | JBS&G
Sydney | Melbourne | Adelaide | Perth | Brisbane
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Sahani Gunatunge

From: Ian Gregson <Ian.Gregson@ghd.com>
Sent: Wednesday, May 18, 2016 12:35 PM
To: Andrew Lau
Cc: lawrence.nethery@health.nsw.gov.au; Jesse Simkus; Beck Earle
Subject: New Maitland Hospital - draft SAQP
Attachments: 112853_draft SAQP 18May2016.pdf

Hi Andrew,
Please find attached the draft SAQP for the Stage 2 investigations. This is essentially the same as the proposed scope provided to you earlier, just in a more formal format with DQOs etc.
Please note the figure showing proposed sampling location (Fig 2) doesn't include the ten "contingency" locations, which will be based on field observations at the discretion of the field manager during sampling or detailed site inspection.
We are planning to set out next Wed / Thurs (25/26 May), so if we can have any comments before then that would be great, thanks. Also a good time if you want to do a site inspection. Probably Wed avo or Thursday morning would be best.

Bek, could you please put this document in Aconex, thanks.

Regards

Ian Gregson
Principal Environmental Consultant; NSW, Vic & Qld EPA Accredited Site Auditor
Certified Practitioner, Site Assessment and Management, SCPA

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WATER | ENERGY & RESOURCES | ENVIRONMENT | PROPERTY & BUILDINGS | TRANSPORTATION

Sahani Gunatunge

From: Andrew Lau
Sent: Friday, May 20, 2016 1:21 PM
To: Ian Gregson; Lawrence Nethery
Cc: Jesse Simkus; Beck Earle; Troy Harvey; Andrew Lau; Sahani Gunatunge
Subject: Audit Comments: New Maitland Hospital - Draft DSI Report (Development Area 1) and draft SAQP (Development Area 2)

Lawrie/Ian,

I've reviewed the reports provided and have the following comments:

Phase 2 ESA – Stage 1 Development Area

- I'm satisfied that, in general, a sufficient amount of investigations have been undertaken to achieve the stated purpose of the report and that the data presented is of a suitable quality. In forming this view, I have taken into account the data presented in the previous investigations as well as the more recent GHD investigation.
- Where fill materials not originating from the site are proposed to be retained on site, then further assessment of leachate potential is required to be undertaken to confirm their suitability to be retained on site. The amount/extent of leachate assessment should also take into consideration potential placement depths in relation to groundwater (i.e., within the quarry void(s)).
- Given the scale of the site works that will be involved in any redevelopment, I'm of the view that a remedial action plan is warranted to clearly identify material placement locations, any capping requirements, validation of removal of identified exceedances etc. If the desire is to call it a site management plan instead of an RAP, that's fine, but my view is that management is a form of remediation (as per the CLM Act) and i will be reviewing the management plan against the EPA's guidance for RAPs.
- Once I have reviewed and accepted the management plan, I see no reason why a Section B SAS and SAR can't be produced for development area 1 stating that the site can be made suitable for the proposed development. However, to do so, a survey plan with boundary co-ordinates will be required to define the Stage 1 development area.

SAQP – Stage 2 Development Area

- The proposed investigations appear to be acceptable based on the site history and previous investigation reports.
- Please consider comment above in relation to leaching potential for any fill materials which have been imported onto the site if they are being considered to be retained on site.

My audit assistant, Sahani, will be in touch with GHD to co-ordinate a site inspection next week while the fieldworks are being undertaken.

Please call if you have any queries.

Regards,
Andrew

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From: Ian Gregson [mailto:Ian.Gregson@ghd.com]
Sent: Wednesday, 18 May 2016 12:35 PM
To: Andrew Lau <ALau@jbsg.com.au>
Cc: lawrence.nethery@health.nsw.gov.au; Jesse Simkus <Jesse.Simkus@ghd.com>; Beck Earle <Rebekah.Earle@ghd.com>
Subject: New Maitland Hospital - draft SAQP

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Please find attached the draft SAQP for the Stage 2 investigations. This is essentially the same as the proposed scope provided to you earlier, just in a more formal format with DQOs etc.
Please note the figure showing proposed sampling location (Fig 2) doesn't include the ten "contingency" locations, which will be based on field observations at the discretion of the field manager during sampling or detailed site inspection.
We are planning to set out next Wed / Thurs (25/26 May), so if we can have any comments before then that would be great, thanks. Also a good time if you want to do a site inspection. Probably Wed avo or Thursday morning would be best.

Bek, could you please put this document in Aconex, thanks.

Regards

Ian Gregson
Principal Environmental Consultant; NSW, Vic & Qld EPA Accredited Site Auditor
Certified Practitioner, Site Assessment and Management, SCPA

GHD
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Sahani Gunatunge

From: Ian Gregson <Ian.Gregson@ghd.com>
Sent: Friday, May 20, 2016 1:46 PM
To: Andrew Lau; lawrence.nethery@health.nsw.gov.au
Cc: Jesse Simkus; Troy Harvey; Sahani Gunatunge
Subject: RE: Audit Comments: New Maitland Hospital - Draft DSI Report (Development Area 1) and draft SAQP (Development Area 2)

Thanks Andrew,
I believe almost all fill material present on site will have originated on site, but an RAP / management plan can incorporate provision for assessment of leachability for any fill that isn't.
Stage 1 corresponds with a Lot and DP, so shouldn't need further survey, although Stage 2 will.
We'll talk to HI (perhaps next week during the site inspection) about timing to prepare an RAP.
We will look at potential requirements for leachability testing during the Stage 2 site investigations.

Regards

Ian Gregson
Principal Environmental Consultant; NSW, Vic & Qld EPA Accredited Site Auditor
Certified Practitioner, Site Assessment and Management, SCPA

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From: Andrew Lau [mailto:ALau@jbsg.com.au]
Sent: Friday, 20 May 2016 1:21 PM
To: Ian Gregson <Ian.Gregson@ghd.com>; Lawrence Nethery (InTouch) <lawrence.nethery@health.nsw.gov.au>
Cc: Jesse Simkus <Jesse.Simkus@ghd.com>; Beck Earle <Rebekah.Earle@ghd.com>; Troy Harvey <Troy.Harvey@health.nsw.gov.au>; Andrew Lau <ALau@jbsg.com.au>; Sahani Gunatunge <SGunatunge@jbsg.com.au>
Subject: Audit Comments: New Maitland Hospital - Draft DSI Report (Development Area 1) and draft SAQP (Development Area 2)

Lawrie/Ian,

I've reviewed the reports provided and have the following comments:

Phase 2 ESA – Stage 1 Development Area

- I'm satisfied that, in general, a sufficient amount of investigations have been undertaken to achieve the stated purpose of the report and that the data presented is of a suitable quality. In forming this view, I have taken into account the data presented in the previous investigations as well as the more recent GHD investigation.
- Where fill materials not originating from the site are proposed to be retained on site, then further assessment of leachate potential is required to be undertaken to confirm their suitability to be retained on site. The amount/extent of leachate assessment should also take into consideration potential placement depths in relation to groundwater (i.e., within the quarry void(s)).
- Given the scale of the site works that will be involved in any redevelopment, I'm of the view that a remedial action plan is warranted to clearly identify material placement locations, any capping requirements, validation of removal of identified exceedances etc. If the desire is to call it a site management plan instead of an RAP, that's fine, but my view is that management is a form of remediation (as per the CLM Act) and i will be reviewing the management plan against the EPA's guidance for RAPs.

- Once I have reviewed and accepted the management plan, I see no reason why a Section B SAS and SAR can't be produced for development area 1 stating that the site can be made suitable for the proposed development. However, to do so, a survey plan with boundary co-ordinates will be required to define the Stage 1 development area.

SAQP – Stage 2 Development Area

- The proposed investigations appear to be acceptable based on the site history and previous investigation reports.
- Please consider comment above in relation to leaching potential for any fill materials which have been imported onto the site if they are being considered to be retained on site.

My audit assistant, Sahani, will be in touch with GHD to co-ordinate a site inspection next week while the fieldworks are being undertaken.

Please call if you have any queries.

Regards,
Andrew

Andrew Lau | Managing Director, Accredited Auditor | JBS&G
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From: Ian Gregson [mailto:Ian.Gregson@ghd.com]
Sent: Wednesday, 18 May 2016 12:35 PM
To: Andrew Lau <ALau@jbsg.com.au>
Cc: lawrence.nethery@health.nsw.gov.au; Jesse Simkus <Jesse.Simkus@ghd.com>; Beck Earle <Rebekah.Earle@ghd.com>
Subject: New Maitland Hospital - draft SAQP

Hi Andrew,
Please find attached the draft SAQP for the Stage 2 investigations. This is essentially the same as the proposed scope provided to you earlier, just in a more formal format with DQOs etc.
Please note the figure showing proposed sampling location (Fig 2) doesn't include the ten "contingency" locations, which will be based on field observations at the discretion of the field manager during sampling or detailed site inspection.
We are planning to set out next Wed / Thurs (25/26 May), so if we can have any comments before then that would be great, thanks. Also a good time if you want to do a site inspection. Probably Wed avo or Thursday morning would be best.

Bek, could you please put this document in Aconex, thanks.

Regards

Ian Gregson
Principal Environmental Consultant; NSW, Vic & Qld EPA Accredited Site Auditor
Certified Practitioner, Site Assessment and Management, SCPA

GHD

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Sahani Gunatunge

From: Ian Gregson <Ian.Gregson@ghd.com>
Sent: Wednesday, June 8, 2016 4:57 PM
To: Andrew Lau; lawrence.nethery@health.nsw.gov.au; Troy Harvey
Cc: Jesse Simkus; Evette Griffin
Subject: New Maitland Hospital - Draft RAP for Stage 1 Development Area
Attachments: 113050_Draft Stage 1 RAP_8June2016.pdf; 3201_Sections.pdf; WB-AR-PDF-1001_E.pdf; WB-AR-PDF-1202_F.pdf

Importance: High

Hi Andrew, Lawrie & Troy,
Please find attached the draft RAP for Stage 1 area, for your review and comment. Please let me know if you would like a word version.

I haven't included all the appendices – I can forward these if required. Appendix A Figures are simply Figures 1 – 6 from the DSI report, and Appendix C is the results tables from the DSI report together with the previous investigation tables (also included in the DSI report).

I have attached the Appendix B concept design drawings that we propose to include, in case you don't have them. (Lawrie, please let me know if there are any more recent concept design drawings that should be used instead).

Happy to discuss any of this at your convenience.

Regards

Ian Gregson
Principal Environmental Consultant; NSW, Vic & Qld EPA Accredited Site Auditor
Certified Practitioner, Site Assessment and Management, SCPA

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Sahani Gunatunge

From: Andrew Lau
Sent: Thursday, June 9, 2016 5:25 PM
To: Lawrence Nethery
Cc: Ian Gregson; Troy Harvey; Jesse Simkus; Andrew Lau; Sahani Gunatunge
Subject: Re: New Maitland Hospital, Stage 2 groundwater wells

Ian/Lawrie

I'm comfortable with what's proposed.

Andrew

Andrew Lau
JBS&G
0412 512 614
www.jbsg.com.au

On 9 Jun 2016, at 17:12, Lawrence Nethery <Lawrence.Nethery@health.nsw.gov.au> wrote:

> Thanks Ian,
> Read and understood -- you've done quite well to get that far in the week of weather we've just had.
> I will revert to Andrew Lau to review and comment on the outstanding well information and whether its substantial to his review and findings.
> Pls let me know how you get on by COB tomorrow.
> Many thanks.
>
> Regards,
>
> **Lawrence Nethery**
>
> Project Director | **Health Infrastructure**
> Level 6,77 Pacific Highway ,North Sydney NSW 2060 | Mailing Address: PO Box 1060, North Sydney NSW 2059
> Tel 02 9978 5427 | Fax 02 8904 1377 | Mob 0422 441 857 | lawrence.nethery@health.nsw.gov.au
> www.hinfra.health.nsw.gov.au
>
> <image001.png>
>
>

From: Ian Gregson [mailto:Ian.Gregson@ghd.com]
Sent: Thursday, 9 June 2016 4:53 PM

To: Andrew Lau (ALau@jbsg.com.au) <ALau@jbsg.com.au>; Lawrence Nethery <Lawrence.Nethery@health.nsw.gov.au>
Cc: Troy Harvey <Troy.Harvey@health.nsw.gov.au>; Jesse Simkus <Jesse.Simkus@ghd.com>
Subject: New Maitland Hospital, Stage 2 groundwater wells
Importance: High

Hi folks,
We encountered about a day and a half of delays this week due to wet weather related access difficulties, which has put us behind on the groundwater well drilling program. We have installed the following wells, as indicated on the attached figure:

- MW501 – screened 6 – 9 m bgl in siltstone and coal, water strike at 7.5 m bgl
- MW502 – screened ~8.7 – 11.7 m bgl in siltstone and coal, water strike at 10 m bgl
- MW503S - screened ~3.5 – 8 m bgl in siltstone, water strike at 8 m bgl (this pair of wells somewhat elevated from floor of former quarry)
- MW503D - screened ~12 – 15 m bgl in siltstone, water strike at 12.5 m bgl
- MW505 – in progress, still augering (proposed to complete tomorrow)

Wells from previous investigations include the following:

- MW401 – screened 7 - 11.5 m bgl in shale and sandstone, SWL 1.2 mbgl
- MW402 – screened 4.5 – 10.5 m bgl, in siltstone / claystone and coal, SWL 2 m bgl.
- MW404D – screened 6.0 – 9.0 m bgl, in claystone underlying coal (not screened in coal), SWL 0 m bgl (this pair of wells is actually where MW405 is shown [incorrectly] on the attached figure).
- MW404S - screened 0.3 – 0.9 m bgl, in sandy clay, SWL 0.5 m bgl.

Groundwater flow (from stage 1 investigations) is generally north east, however there was a localised gradient towards MW404, probably from the higher fill areas directly to the west of this well.

With the remaining time this week, we won't be able to install all remaining proposed wells (MW504D and S), but we are aiming to complete the following:

- MW505 (currently in progress – will be a deep well as it is on higher ground)
- MW504S (not yet started – base of former quarry – will install a bit deeper than MW404S, particularly if there is no deep well at this location)

This leaves MW504D which will not be completed. As we will have a shallow well in this area (which is at the base of former quarrying activities), as well as upgradient and downgradient shallow and deep wells, we don't consider this remaining deep well is critical to the site assessment (will be more representative of underlying geology than any potential impact from the site), and given time constraints we propose to drop this well from the program. This email is to check whether anyone (Andrew in particular) has any concerns in this regard.

Please let me know tomorrow (Friday) morning if possible, thanks.

Regards

Ian Gregson
Principal Environmental Consultant; NSW, Vic & Qld EPA Accredited Site Auditor
Certified Practitioner, Site Assessment and Management, SCPA

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Sahani Gunatunge

From: Andrew Lau
Sent: Thursday, June 16, 2016 2:26 PM
To: Ian Gregson; Lawrence Nethery
Cc: Jesse Simkus; Beck Earle; Troy Harvey; Sahani Gunatunge; Andrew Lau
Subject: Audit Comments: New Maitland Hospital - Draft RAP Stage 1 Development Area

Ian/Lawrie

I've reviewed the draft RAP and have the following comments:

- s.1.1. If it is intended to accept / reuse materials from the broader site area (i.e., the later stages), then this should be established and defined in the description of the overall project site as distinct from the stage 1 area so as to avoid any unintentional triggering of various waste regulatory requirements.

- s.1.3/s.1.4/s.5.1. If the desire is to receive a Section B Site Audit Statement (SAS) confirming that the site can be made suitable for the proposed uses, then this must be reflected in the purpose/objectives of the RAP, noting that the RAP presents conclusions around site suitability. The currently worded purpose/objectives would only be able to certify that the RAP is appropriate for its stated purpose, and I would have to remain silent on proposed landuses.

- s.1.6. Please explicitly state who will be undertaking material inspections and material clearances following the various handling/segregation activities and also include details later in the RAP as part of the validation process.

- s.3.2./s.12.2 Please discuss and provide assessment of whether the works are category 1 or 2 under SEPP55, having regard to the relevant triggers. Please also include the relevant pre and post notification requirements.

- s.4. It is unclear how and where the nominated criteria will be applied for the various proposed landuses.

- s.6.1. Given the extent of material movements and reliance on placing materials at depth to mitigate potential exposures, a material tracking plan should also be required to be prepared and reviewed by the auditor.

- s.6.6.3. The discussion around the low permeability cap may be confusing to a contractor. I accept earlier discussion in the RAP that the impacted materials identified to date do not require a low permeability cap and would be satisfied if this section was simplified to remove reference to low permeability capping. I would like to see the inclusion of a marker layer as a minimum requirement, consistent with relevant guidance referred to in the RAP.

- s.6.1.1 the LTEMP requirements should also make reference to the combustion risk management requirements discussed in s.6.6.4.

- s.6.9. If I am to sign off on the suitability of the site at the completion of construction, then I will require imported construction and landscaping materials to be appropriately validated for common COPCs in these materials, namely heavy metals, PAHs and asbestos, regardless whether this is a requirement under Australian Standards.

- s.8.5.1 Please provide some sampling/analyses/criteria/decision rules around surface water discharge requirements as the proposed consultation approach proposed in the RAP is, in my view, unlikely to be practical during short-notice discharges after heavy rainfall/storm events.

- s.9.3 material tracking documentation (both within the site and external to the site) will be required inputs into the decision making process.

Happy to discuss if you have any queries.

Regards,
Andrew

Andrew Lau | Managing Director, Accredited Auditor | JBS&G
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Sahani Gunatunge

From: Andrew Lau
Sent: Thursday, June 16, 2016 2:45 PM
To: Ian Gregson; lawrence.nethery@health.nsw.gov.au
Cc: Jesse Simkus; Troy Harvey; Sahani Gunatunge; Andrew Lau
Subject: RE: Audit Comments: New Maitland Hospital - Draft RAP Stage 1 Development Area

Yes, that's fine.

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---

From: Ian Gregson [mailto:Ian.Gregson@ghd.com]
Sent: Thursday, 16 June 2016 2:43 PM
To: Andrew Lau <ALau@jbsg.com.au>; lawrence.nethery@health.nsw.gov.au
Cc: Jesse Simkus <Jesse.Simkus@ghd.com>; Troy Harvey <Troy.Harvey@health.nsw.gov.au>; Sahani Gunatunge <SGunatunge@jbsg.com.au>
Subject: RE: Audit Comments: New Maitland Hospital - Draft RAP Stage 1 Development Area

Thanks Andrew,
We will address these comments. Are you happy for some aspects to be addressed as part of final design, provided the principles are covered in the RAP? (eg. marker layer). Where materials are placed at significant depth (and given we are dealing with large volumes of natural material with some problematic characteristics), I wouldn't think a marker layer is warranted – the principle could be if the materials are potentially subject to disturbance during use or maintenance of the site (excluding major redevelopment), then there should be a marker layer. Most likely to apply to any "arisings" of unexpected material during development. Are you happy with these principles?

Regards

Ian Gregson
Principal Environmental Consultant; NSW, Vic & Qld EPA Accredited Site Auditor
Certified Practitioner, Site Assessment and Management, SCPA

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From: Andrew Lau [mailto:ALau@jbsg.com.au]
Sent: Thursday, 16 June 2016 2:26 PM
To: Ian Gregson <Ian.Gregson@ghd.com>; Lawrence Nethery (InTouch) <lawrence.nethery@health.nsw.gov.au>
Cc: Jesse Simkus <Jesse.Simkus@ghd.com>; Beck Earle <Rebekah.Earle@ghd.com>; Troy Harvey <Troy.Harvey@health.nsw.gov.au>; Sahani Gunatunge <SGunatunge@jbsg.com.au>; Andrew Lau <ALau@jbsg.com.au>
Subject: Audit Comments: New Maitland Hospital - Draft RAP Stage 1 Development Area

Ian/Lawrie

I've reviewed the draft RAP and have the following comments:

- s.1.1. If it is intended to accept / reuse materials from the broader site area (i.e., the later stages), then this should be established and defined in the description of the overall project site as distinct from the stage 1 area so as to avoid any unintentional triggering of various waste regulatory requirements.

- s.1.3/s.1.4/s.5.1. If the desire is to receive a Section B Site Audit Statement (SAS) confirming that the site can be made suitable for the proposed uses, then this must be reflected in the purpose/objectives of the RAP, noting that the RAP presents conclusions around site suitability. The currently worded purpose/objectives would only be able to certify that the RAP is appropriate for its stated purpose, and I would have to remain silent on proposed landuses.

- s.1.6. Please explicitly state who will be undertaking material inspections and material clearances following the various handling/segregation activities and also include details later in the RAP as part of the validation process.

- s.3.2./s.12.2 Please discuss and provide assessment of whether the works are category 1 or 2 under SEPP55, having regard to the relevant triggers. Please also include the relevant pre and post notification requirements.

- s.4. It is unclear how and where the nominated criteria will be applied for the various proposed landuses.

- s.6.1. Given the extent of material movements and reliance on placing materials at depth to mitigate potential exposures, a material tracking plan should also be required to be prepared and reviewed by the auditor.

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- s.6.9. If I am to sign off on the suitability of the site at the completion of construction, then I will require imported construction and landscaping materials to be appropriately validated for common COPCs in these materials, namely heavy metals, PAHs and asbestos, regardless whether this is a requirement under Australian Standards.

- s.8.5.1 Please provide some sampling/analyses/criteria/decision rules around surface water discharge requirements as the proposed consultation approach proposed in the RAP is, in my view, unlikely to be practical during short-notice discharges after heavy rainfall/storm events.

- s.9.3 material tracking documentation (both within the site and external to the site) will be required inputs into the decision making process.

Happy to discuss if you have any queries.

Regards,
Andrew

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Sahani Gunatunge

From: Sahani Gunatunge
Sent: Tuesday, July 12, 2016 5:00 PM
To: Lawrence.Nethery@health.nsw.gov.au; Troy.Harvey@health.nsw.gov.au
Cc: Andrew Lau
Subject: Stage 1 Maitland Hospital - Site Audit Report and Statement
Attachments: L01 (SAS Maitland Hospital Stage 1 Rev 0).pdf

Dear Lawrence/Troy,

On behalf of Andrew, please find attached the Site Audit Statement prepared for Stage 1 of New Maitland Hospital and a link below to download the accompanying Site Audit Report.

https://jbsg-my.sharepoint.com/personal/sgunatunge_jbsg_com_au/_layouts/15/guestaccess.aspx?guestaccesstoken=FwWFvH8%2bIb%2fzq7I7e2VSQmcvqTH9MWMjQvLHkAyGoSE%3d&docid=078e619bd628a4e56b0e146a84a4a2422

Please let me know if you have any difficulties viewing the file.

Kind Regards,

Sahani Gunatunge | Environmental Engineer / Auditor Assistant | JBS&G
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Sahani Gunatunge

From: Andrew Lau
Sent: Thursday, January 19, 2017 4:53 PM
To: mark.davis@aecom.com; troy.harvey@health.nsw.gov.au
Cc: Andrew Lau; Sahani Gunatunge
Subject: HI Metford - Contamination Summary as at Jan 2017

Mark,

Good to chat. As discussed, here's a quick summary of where I think the contamination / remediation planning process has progressed to:

- In the first half of 2016, GHD completed detailed contamination investigations and prepared a Remedial Action Plan (RAP) / Material Management Plan (MMP) for Stage 1.
- Following this, as the appointed NSW EPA Site Auditor, I issued a Section B Site Audit Statement (SAS) and accompanying Site Audit Report (SAR) confirming that the site can be made suitable for the proposed uses subject to implementation of the GHD RAP/MMP.
- In the second half of 2016, GHD completed detailed contamination investigations on the Stage 2 portion. I provided audit review comments and they were going to undertake some minor additional investigations and finalise the report. I am not sure whether these works were completed but I don't appear to have received the final report with the additional investigations. GHD were also planning on writing a RAP / MMP for Stage 2 (similar to the Stage 1 version) but I am yet to be provided with this and I'm not aware whether GHD has written it.
- Also in late 2016, Lawrence Nethery requested my views on the potential acquisition of Stage 2, which I provided from the perspective of the site auditor. I will forward this separately to both you and Troy.

In my view, it would make sense to finalise the contamination investigations on Stage 2 so that I can provide the same audit sign off / documentation as I have for Stage 1.

Hope this helps.

Happy to meet to discuss.

Regards,
Andrew

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Sahani Gunatunge

From: Andrew Lau
Sent: Thursday, January 19, 2017 5:09 PM
To: troy.harvey@health.nsw.gov.au; mark.davis@aecom.com
Cc: Andrew Lau
Subject: FW: Metford -- potential acquisition of adjoining site (Lot 266) of 15 Hecaters

Troy/Mark,
Please see advice below previously provided to Lawrie in relation to potential purchase of Lot 266.
Regards,
Andrew

Andrew Lau | Managing Director, Accredited Auditor | JBS&G
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From: Lawrence Nethery [mailto:Lawrence.Nethery@health.nsw.gov.au]
Sent: Thursday, 1 September 2016 11:34 AM
To: Andrew Lau <ALau@jbsg.com.au>
Cc: Sahani Gunatunge <SGunatunge@jbsg.com.au>
Subject: RE: Metford -- potential acquisition of adjoining site (Lot 266) of 15 Hecaters

OK - thanks Andrew - that's really helpful

Regards,

Lawrence Nethery

Senior Project Director | **Health Infrastructure**
Level 6,77 Pacific Highway ,North Sydney NSW 2060 | Mailing Address: PO Box 1060, North Sydney NSW 2059
Tel 02 9978 5427 | Fax 02 8904 1377 | Mob 0422 441 857 | lawrence.nethery@health.nsw.gov.au
www.hinfra.health.nsw.gov.au

From: Andrew Lau [mailto:ALau@jbsg.com.au]
Sent: Thursday, 1 September 2016 9:46 AM

To: Lawrence Nethery <Lawrence.Nethery@health.nsw.gov.au>
Cc: Andrew Lau <ALau@jbsg.com.au>; Sahani Gunatunge <SGunatunge@jbsg.com.au>
Subject: RE: Metford -- potential acquisition of adjoining site (Lot 266) of 15 Hecaters

Lawrie,

In response to your email below, here are my views/comments:

- The management strategy for Stage 1 (and presumably for the later stages as well) is largely based around retention of materials on site at depth and in places appropriate for the proposed landuses. Having the additional area/land available through the purchase of Lot 266 would maximise the opportunity for soils to be retained on site which means less cost in terms of disposing excess soils off site which (typically) attract the waste levy depending how impacted they are.

- Using your example below, a hypothetical roadway 500 m long x 10 m wide x 1 m deep (profile), the cost of disposing this to a licensed landfill at current market rates of (say) $350/m3 is around $1.8 M. This cost is based on the lowest waste classification of `general solid waste', noting that much of the materials on the site have been disturbed so are not able to be removed as Virgin Excavated Natural Materials (VENM).

- The size of the overall site means that there are likely to be unexpected finds encountered during large scale earthworks typically required during the construction of new health facilities. Having the additional land available to either treat and or store materials on site further reduces the potential for cost increases due to contamination arising from off-site disposal.

- Once the overall landform and site usage has been defined, you may still have opportunity to accept additional (suitable) materials onto site. This is a long term facility and waste levies continue to increase considerably year on year. If you have excess capacity (volume/airspace) on Lot 266 then, subject to approvals, you may be able to receive clean soils into the future from off-site. There are many passive landholders who utilise former quarry/pit areas to accept certain (suitable) materials and charge for this. Depending on volume, this could be a potentially significant source of revenue into the future for a period of time.

For these reasons, and also based on the available information provided by GHD to date on Lot 266 (which shows relatively low levels of contamination), I think it would be of great benefit from a contamination management viewpoint to obtain Lot 266 if it was able to be purchased at an appropriate price.

Hope this helps,
Andrew

Andrew Lau | Managing Director, Accredited Auditor | JBS&G
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Contaminated Land | Groundwater Remediation | Auditing and Compliance | Assessments and Approvals | Occupational Hygiene and Monitoring

---

From: Lawrence Nethery [mailto:Lawrence.Nethery@health.nsw.gov.au]
Sent: Friday, 26 August 2016 6:11 PM
To: Andrew Lau <ALau@jbsg.com.au>
Subject: Metford -- potential acquisition of adjoining site (Lot 266) of 15 Hecaters

Andrew,

As discussed briefly on Wednesday, we are currently looking at our acquisition options for Lot 266 (15+ Hectares) - adjoining the acquired Lot 7314 (17.5Hectares).
A question might come up -- depending on our timing and announcements -- as to what is the value - in terms of Civil and Remediation Engineering terms - of having an adjoining area of 15 Hectares - to treat and stockpile GSW waste ?

A an example, given the access road along the boundary might be say 500metres long by say a profile of 1.0m deep etc etc - is there a tipping point ($/m3) of treating waste on site(as distinct to hauling it off site) to add value to the Project, and how might we look at framing that remediation cost/benefit value equation as an imperative to acquire the site sooner rather than later.

If you are able to help us frame our thoughts in this regard it'd be very helpful.
If u think its necessary =- we would be able to offer some rough quantities for the 'as yet' Hospital civil profiles.

Thanks

Regards,

Lawrence Nethery

Project Director | **Health Infrastructure**
Level 6,77 Pacific Highway ,North Sydney NSW 2060 | Mailing Address: PO Box 1060, North Sydney NSW 2059
Tel 02 9978 5427 | Fax 02 8904 1377 | Mob 0422 441 857 | lawrence.nethery@health.nsw.gov.au
www.hinfra.health.nsw.gov.au

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Views expressed in this message are those of the individual sender, and are not necessarily the views of NSW Health or any of its entities.

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Views expressed in this message are those of the individual sender, and are not necessarily the views of NSW Health or any of its entities.

Sahani Gunatunge

From: Andrew Lau
Sent: Thursday, September 28, 2017 12:10 PM
To: Davis, Mark (Sydney)
Cc: Willott, Rebecca; Sahani Gunatunge; Andrew Lau; lawrence.nethery@health.nsw.gov.au
Subject: RE: NMH - Disposal of Material from Metford Road works

Hi Mark,

The material will need to be demonstrated as being suitable for reuse. I would need to review the Douglas Partners test report in order to confirm whether the material is suitable.

Process for another SAR/SAS for Lot 7314 would look something like:

- Consultant would need to undertake a site inspection and assess whether any new materials / any change since the previous studies and audit. If no changes / no new materials, then consultant issues a letter confirming this. If site conditions have changed / new materials present then there will need to be additional test data provided to demonstrate the suitability of the site for the intended use and if any additional remediation is required this will also mean a revision to the RAP.
- The audit process will review all of the previous dot point works plus another site inspection, then produce a new SAR/SAS, noting that I'm not able to revise/update a (previous) SAS/SAR once its issued other than to correct a minor typographical error like an incorrect lot number. Timeframe to do this is about 3 weeks assuming no additional testing required in the previous dot point.

Regards,
Andrew

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---

From: Davis, Mark (Sydney) [mailto:mark.davis@aecom.com]
Sent: Wednesday, 27 September 2017 3:10 PM
To: Andrew Lau <ALau@jbsg.com.au>
Cc: Willott, Rebecca <rebecca.willott@aecom.com>
Subject: NMH - Disposal of Material from Metford Road works

Hi Andrew,

Hope you are well? We are currently out to tender on the New Maitland Hospital Enabling Works. The tenderer has asked if excess road base material from their reconfiguration of Metford Road can be disposed of on Lot 7314. Before I respond to the tenderer I've assumed the material will require classifying which Douglas Partners in the process of doing. If it is deemed re-useable can we use it on Lot 7314?

Do you see any issues with this from a Site Audit perspective?

On another matter, we may need to get you to update your SAS for Lot 7314 at the point when we take over the site from CSR. How do you suggest we proceed with this and how long would you need to complete this process including inspections and provision of an updated SAS?

Regards,

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mark.davis@aecom.com

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Sahani Gunatunge

From: Davis, Mark (Sydney) <mark.davis@aecom.com>
Sent: Friday, October 6, 2017 2:18 PM
To: Andrew Lau
Cc: Willott, Rebecca; Michael Brooks; Sahani Gunatunge
Subject: RE: NMH - Validation of Lot 7314

Hi Andrew,

To keep you informed we have engaged GHD today to commence with the site inspection as noted in your email below. The aim is to complete this next week to allow sufficient time for JBS&G to complete their work to issue a new Site Audit Statement for Lot 7314.

The services GHD will be performing include:

- We understand the purpose of this work is to confirm whether there are any changes to Lot 7314 compared with the site condition when we completed our DSI report. At this stage we assume that no potentially contaminated material has been moved onto the site, and we have not allowed for sampling or testing;
- Site walkover inspection with particular emphasis on checking whether any materials have been moved onto Lot 7314. This will be undertaken by someone familiar with the previous site condition (Jesse Simkus, or if not available, Ian Gregson), and comparison will be assisted by reference to aerial photographs and site plans, and reference to previous site photographs. We will undertake the inspection next week if access is available to the site;
- Prepare a brief factual report describing the current site condition and any significant changes, with reference to a photo log, and cross referencing our recent groundwater monitoring report;
- Provide a draft of the report for review by HI and the auditor. We will aim to provide the report early;
- Finalise the report following receipt of one set of consolidated comments.

Regards,

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From: Andrew Lau [mailto:ALau@jbsg.com.au]
Sent: Wednesday, 4 October 2017 4:42 PM
To: Davis, Mark (Sydney)
Cc: Willott, Rebecca; Michael Brooks; Sahani Gunatunge
Subject: Re: NMH - Validation of Lot 7314

Hi Mark

We'll get a fee proposal across by the end of the week. To help us estimate the timeframes can you please provide dates for when:(1) GHD will provide a site inspection report confirming no change to site condition as at the time of their previous report; and (2) when my assistant Sahani will be able to visit the site after receiving the additional GHD report to confirm what's presented in the report.

Thanks

Andrew

Andrew Lau
JBS&G
0412 512 614
www.jbsg.com.au

On 4 Oct 2017, at 14:33, Davis, Mark (Sydney) <mark.davis@aecom.com> wrote:

> Hi Andrew,
>
> Further to our previous request relating to JBS&G re-validation of Lot 7314, taking into account the time elapsed since you provided your previous SAS and any activity by CSR such as stockpiling if material, we hereby ask that you provide a fee proposal and inform of the earliest date this can be undertaken noting we intend on accessing Lot 7314 by 1 November 2017.
>
> Regards,
>
> **Mark Davis**
> Principal Project Manager
> D +61 2 8934 1076 M +61 488 215 822
> Mark.Davis@aecom.com
>
> **AECOM**
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> aecom.com
>
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>
> Sent from my iPhone

Sahani Gunatunge

From: Sahani Gunatunge
Sent: Wednesday, October 18, 2017 2:32 PM
To: Davis, Mark (Sydney)
Cc: Michael Brooks (Michael.Brooks@health.nsw.gov.au); Willott, Rebecca; Andrew Lau
Subject: RE: New Maitland Hospital - Lot 7314 re-inspection

Hi Mark,

Andrew has reviewed the GHD site condition report, and along with my observations of the site, we accept the findings of the report and have no further comments.

Kind Regards,

Sahani Gunatunge | Environmental Engineer / Auditor Assistant | JBS&G
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---

From: Davis, Mark (Sydney) [mailto:mark.davis@aecom.com]
Sent: Tuesday, October 17, 2017 9:34 AM
To: Andrew Lau <ALau@jbsg.com.au>
Cc: Michael Brooks (Michael.Brooks@health.nsw.gov.au) <Michael.Brooks@health.nsw.gov.au>; Willott, Rebecca <rebecca.willott@aecom.com>; Sahani Gunatunge <SGunatunge@jbsg.com.au>
Subject: FW: New Maitland Hospital - Lot 7314 re-inspection

Andrew,

Find attached a draft letter from GHD following their inspection of Lot 7314 at Metford last week. Please review and advise if this letter is sufficient as drafted for JBS&G to provide a new Site Audit Statement for Lot 7314.

Thanks,

Mark Davis
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From: Ian Gregson [mailto:Ian.Gregson@ghd.com]
Sent: Tuesday, 17 October 2017 9:11 AM
To: Davis, Mark (Sydney); Willott, Rebecca
Cc: Jesse Simkus
Subject: New Maitland Hospital - Lot 7314 re-inspection

Hi Mark,
Please find attached the site inspection letter. We have provided this in draft so you can run it past the auditor and his assistant (who accompanied Jesse on the site inspection). We will finalise it for issue after yours and their review.

Regards

Ian Gregson CPEng
Principal Environmental Consultant; NSW, Vic & Qld EPA Accredited Site Auditor
Certified Practitioner, Site Assessment and Management, SCPA

GHD
T: +61 2 4979 9999 | **D**: 4979 9904 | **V**: 229904 | **M**: 0418 685 838 | **F**: 4979 9988 | **E**: ian.gregson@ghd.com
Level 3, 24 Honeysuckle Drive, Newcastle NSW 2300 | PO Box 5403 Hunter Regional Mail Centre NSW 2310 | www.ghd.com
WATER | ENERGY & RESOURCES | ENVIRONMENT | PROPERTY & BUILDINGS | TRANSPORTATION

Sahani Gunatunge

From: Davis, Mark (Sydney) <mark.davis@aecom.com>
Sent: Wednesday, October 18, 2017 3:00 PM
To: Andrew Lau
Cc: ian.harris@wge.com.au; Ian Gregson; Sahani Gunatunge; Willott, Rebecca; chris.waite@robertbird.com.au; steven.mcclelland@robertbird.com.au; Gavin.Thompson@health.nsw.gov.au; Michael.Gawn@douglaspartners.com.au
Subject: RE: Audit comments: Metford Road Geotechnical and Preliminary Waste Assessment Project 81719.04

Andrew

Thank you for your comments below.

The assumption that the enabling works form part of the broader proposed hospital site (of which Lot 7314 is a part of) is correct from the perspective that Health Infrastructure would prefer to re-use the material from Metford Road on Lot 7314 rather than dispose of it off-site.

Michael

Can you please advise what you would need to do to allow the test results to be assessed against the relevant reuse criteria in the Lot 7314 RAP (which are different to the waste classification criteria used in the DP report)

Appropriate material tracking procedures should be defined such that the Enabling Works contractor can comply with these requirements as intended. Ultimately, the materials will need to be considered suitable for reuse on Lot 7314 prior to them being excavated and removed from Metford Road to Lot 7314. Stockpiling this material on site separate from other material and maintaining it would be preferable to ensure traceability of material imported onto Lot 7314 is considered at all times.

Regards,

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From: Andrew Lau [mailto:ALau@jbsg.com.au]
Sent: Wednesday, 18 October 2017 2:47 PM
To: Davis, Mark (Sydney); Gavin.Thompson@health.nsw.gov.au
Cc: ian.harris@wge.com.au; Ian Gregson; Sahani Gunatunge; Willott, Rebecca; chris.waite@robertbird.com.au; steven.mcclelland@robertbird.com.au; Andrew Lau
Subject: Audit comments: Metford Road Geotechnical and Preliminary Waste Assessment Project 81719.04

Mark/Gavin,

I've reviewed the report and am comfortable with the waste classification provided for the materials should they be require off-site disposal.

However, the report in its current form is not suitable to enable reuse of the materials on Lot 7314.

For the materials to be considered suitable for reuse on Lot 7314, the test results will need to be assessed against the relevant reuse criteria in the Lot 7314 RAP (which are different to the waste classification criteria used in the DP report) and appropriate material tracking procedures being in place, as indicated in your email below.

The advice provided above is based on the assumption that the enabling works form part of the broader proposed hospital site (of which Lot 7314 is a part of) and the materials require assessment for onsite reuse rather than off-site disposal.

Andrew

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---

From: Davis, Mark (Sydney) [mailto:mark.davis@aecom.com]
Sent: Wednesday, 18 October 2017 1:38 PM
To: Gavin.Thompson@health.nsw.gov.au
Cc: ian.harris@wge.com.au; Ian Gregson <Ian.Gregson@ghd.com>; Andrew Lau <ALau@jbsg.com.au>; Sahani Gunatunge <SGunatunge@jbsg.com.au>; Willott, Rebecca <rebecca.willott@aecom.com>; chris.waite@robertbird.com.au; steven.mcclelland@robertbird.com.au
Subject: FW: Metford Road Geotechnical and Preliminary Waste Assessment Project 81719.04
Importance: High

Gavin,

I'm forwarding this correspondence and the attached report for your information. I've copied in those persons I've identified as needing to be kept informed going forward regarding these matters given it involves materials likely to be excavated from Metford Road as part of the NMH Enabling Works and possibly disposed of on Lot 7314 DP 755237.

Donnelley Constructions will receive this report separately as part of the Enabling Works tender negotiation clarifications.

New Maitland Hospital – Enabling Works

Health Infrastructure (HI) engaged Robert Bird Group to undertake design of the New Maitland Hospital Enabling Works (Civil package). These works include the extension of water mains on Metford Road, installation of new/relocation of existing street lighting, adjustment to existing in-ground services (where required) and construction of a new roundabout and related civil works (stormwater drainage, signage and line marking).

Douglas Partners (DP) engaged and instructed by HI to undertake several studies to determine existing geotechnical and ground contamination conditions on Metford Road, the western shoulder where the water main will be laid and where the new roundabout encroaches onto Crown Land. The findings are documented in DP's most recent ***Geotechnical Investigation & Preliminary Waste Classification Report #81719.04.R.001.Rev2*** (see attached).

Preliminary Waste Classification

Verbal advice received from Michael Gawn at DP is that all samples taken in the road reserve and western shoulder (where the water main will be laid) and the Crown Land parcels on Lots 401 DP755237 and Lot 1 DP124247 are able to be dealt with as General Solid Waste. This will enable disposal of surplus material on Lot 7314 consistent with HI's contract with the Enabling Works Contractor (Donnelley Constructions) and subject to final approval of JBS&G who will be issuing a Site Audit Statement for Lot 7314.

- Donnelley Constructions will need to establish material tacking procedures and have these agreed with JBS&G prior to disposing of any material from the Enabling Works area onto Lot 7314.

Geotechnical Investigation

Robert Bird Group (RBG) have premised their civil pavement design on advice received from DP in earlier versions of the attached report. I have included RBG in this email to ask them to review their current design to ensure design assumptions are consistent with DP's findings as set out in the final version of the attached report.

- RBG to confirm design is consistent with DP findings regarding ground conditions

Regards,

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From: Michael Gawn [mailto:Michael.Gawn@douglaspartners.com.au]
Sent: Wednesday, 18 October 2017 11:01 AM
To: Davis, Mark (Sydney)
Cc: John Harvey
Subject: Metford Road Geotechnical and Preliminary Waste Assessment Project 81719.04

Mark,

Please find attached the revised report combining all areas of the enabling works assessments.

Please call if you have any questions.

Regards

Michael Gawn | Principal
Douglas Partners Pty Ltd | ABN 75 053 980 117 | www.douglaspartners.com.au
15 Callistemon Close Warabrook NSW 2304 | Box 324 Hunter Region Mail Centre NSW 2310
P: 02 4960 9600 | F: 02 4960 9601 | M: 0412 760 942 | E: Michael.Gawn@douglaspartners.com.au

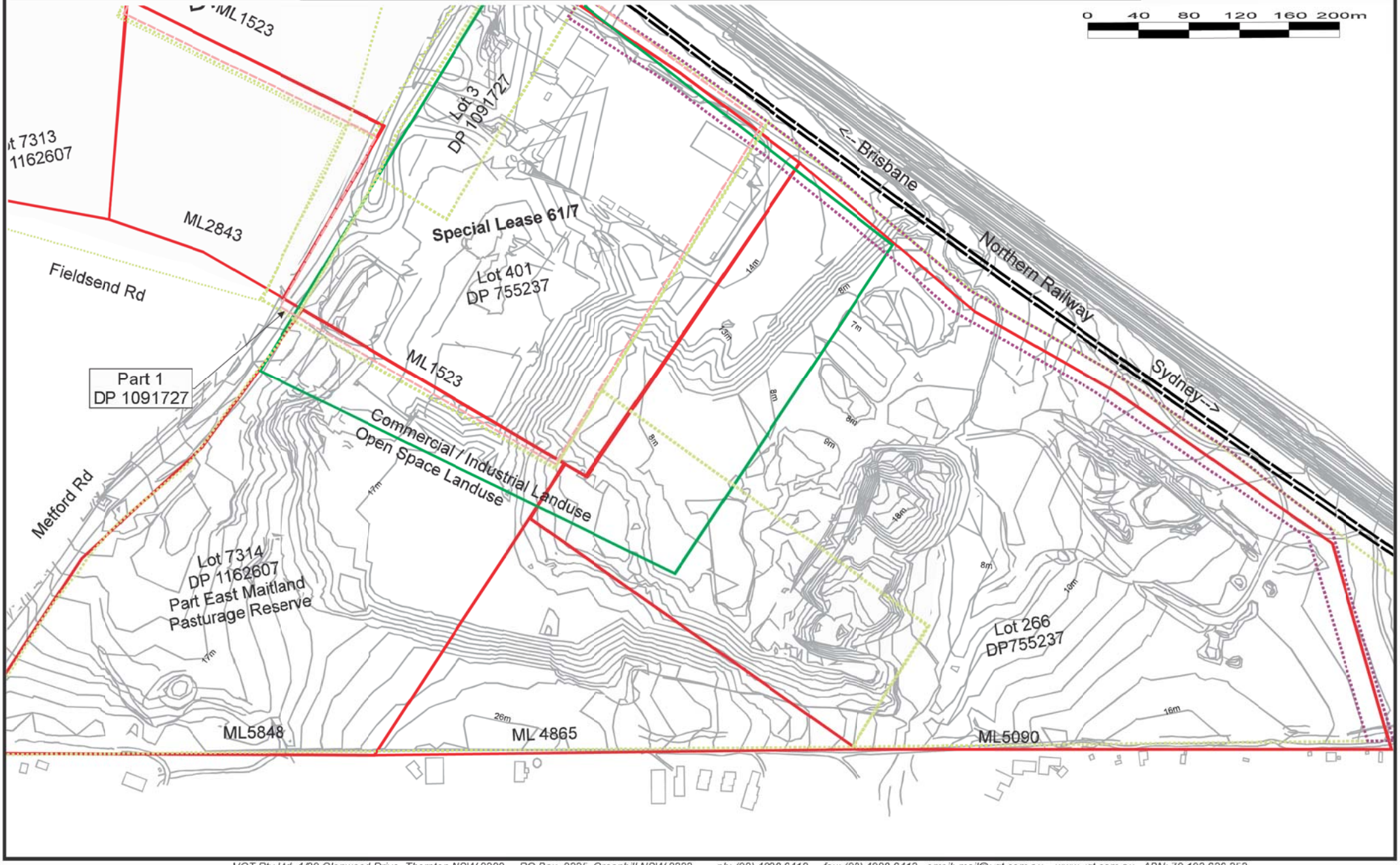
Appendix C Site Plan

Plan of:	Conceptual Final Landform	**Location:**	Metford Clay Mine	**Source:**	From Figure 11 SoEE (Ref 8) Boundaries Not Surveyed	**Our Ref:**	MT\2014\MOP 2014\Closure MOP 1400774_6\Fig5
Figure:	5	**Council:**	Maitland City Council	**Survey:**	AAM Hatch 27/2/06 1m contours	**Plan By:**	LGT
Sheet:	1 of 1	**Tenures:**	ML 1523, 5848, 4865, 5090	**Projection:**	MGA	**Project Manager:**	GVT
Version/Date:	A 9/03/2015	**Client:**	CSR Building Products Ltd	**Contour Interval:**	1m	**Office:**	Thornton **Scale:**

vgt Environmental Compliance Solutions

N

0 40 80 120 160 200m



VGT Pty Ltd 4/30 Glenwood Drive, Thornton NSW 2322 PO Box 2335, Greenhill NSW 2323 ph: (02) 4028 6412 fax: (02) 4028 6413 email: mail@vgt.com.au www.vgt.com.au ABN: 79 103 636 353

A4
0 100 200
Scale Metres

N

LEGEND
Site Boundary
Area No.

GHD

Health Infrastructure
New Maitland Hospital, Metford

Site Location

Job Number	22-18003
Revision	0
Date	11 Sep 2015

Figure 1

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 Australia **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com

Appendix D Consultant's Figures

A4
0 100 200
Scale Metres

N

LEGEND
Site Boundary
Area No.

GHD

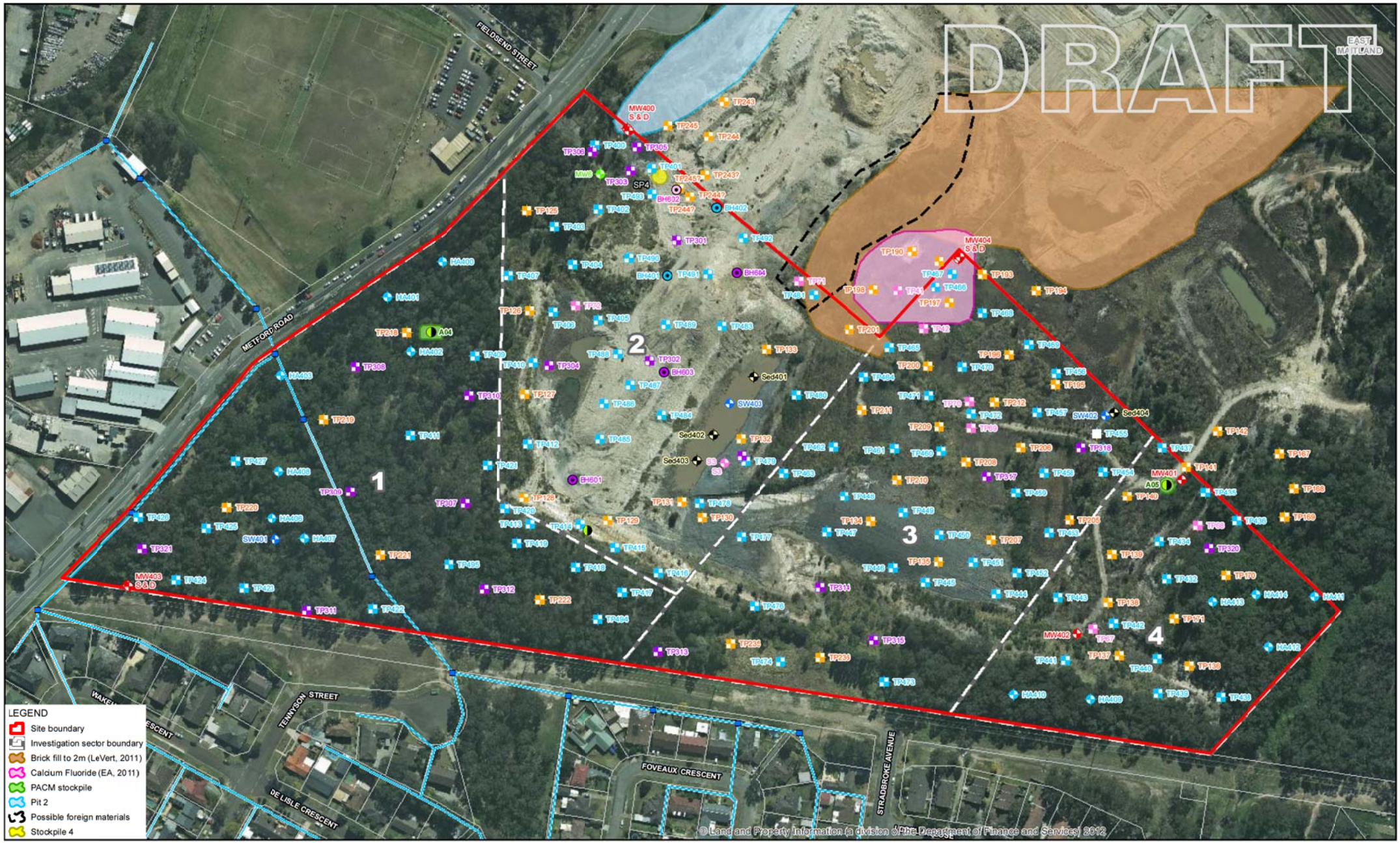
Health Infrastructure
New Maitland Hospital, Metford

Site Location

Job Number	22-18003
Revision	0
Date	11 Sep 2015

Figure 1

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 Australia **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com



Paper Size A3

0 10 20 40 60 80

Metres

Map Projection Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

LEGEND

- Cadastre
- DLA Test pit
- DP / GHD test pit
- DP Soil bore
- Existing monitoring well
- GHD / DP soil bore
- GHD Hand auger
- GHD Monitoring wells
- GHD Sediment sample
- GHD Soil bore
- GHD Surface water sample
- GHD Test pit
- LeVert soil sample
- LeVert test pit
- PACM
- Sewer pit
- Sewer main

Health Infrastructure
New Maitland Hospital, Metford
Stage 1 Development Area
Phase 2 ESA
Sampling Locations

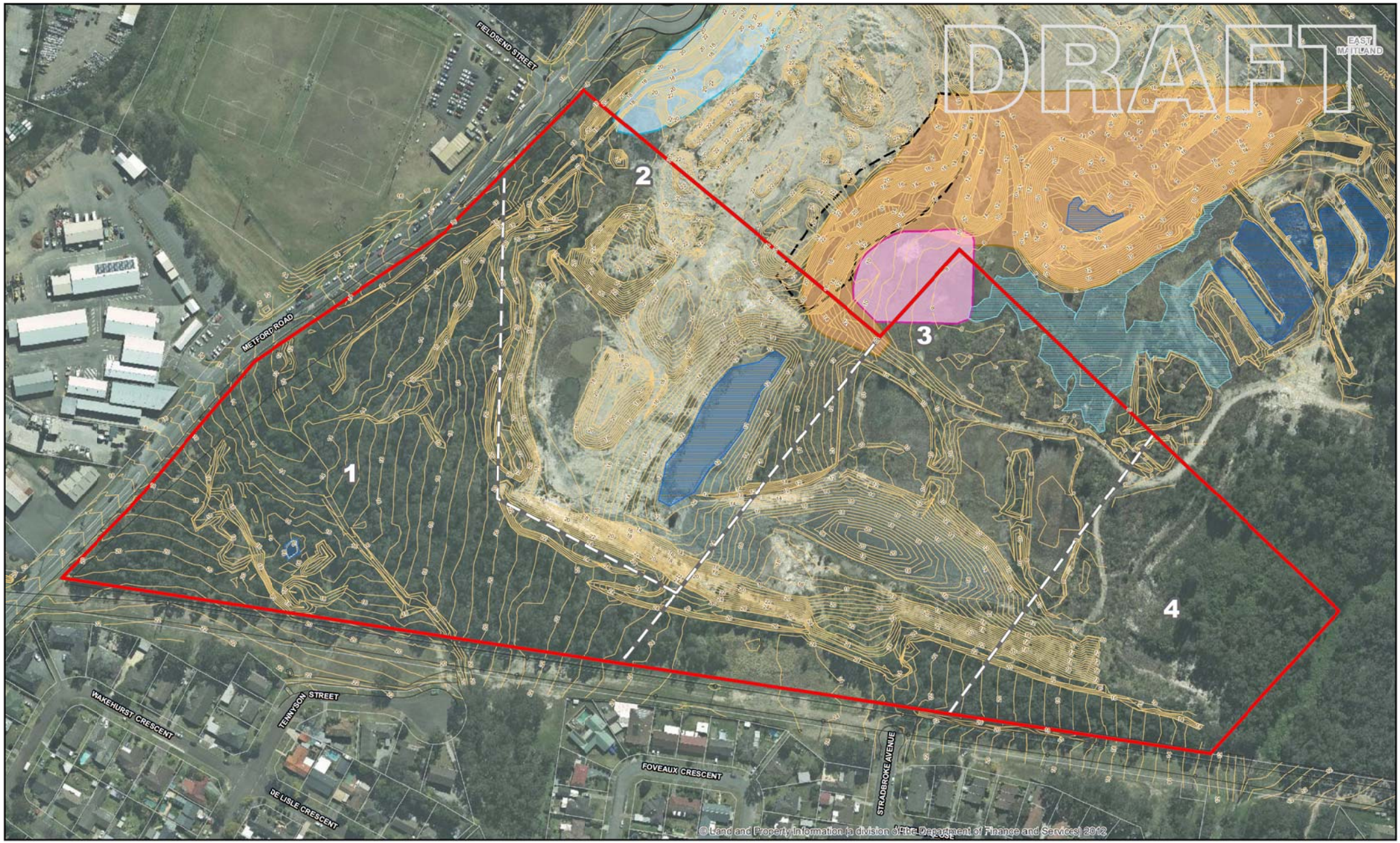
Job Number 22-18003
Revision C
Date 19 Nov 2015

Figure 2

G:\22\18003\GIS\Maps\Deliverables\SiteWorks\22218003_SW001_SampleLocations_C.mxd

Data source: ADW: Survey, 2015 LPI: DTDB / DCDB / Aerial Imagery, 2012. HWC: Dial Before You Dig Sewermain, 2015. Created by: fmackay, tmorton, gmcdiarmid

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au



Paper Size A3

0 10 20 40 60 80

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

LEGEND

- Cadastre
- Site boundary
- Waterbody
- Waterbody approx. location
- Survey
- Contours
- Brick fill to 2m
- Calcium Fluoride (EA, 2011)
- Pit 2
- Possible foreign materials
- Investigation sector boundary

Health Infrastructure
New Maitland Hospital, Metford
Stage 1 Development Area
Phase 2 ESA
Topography

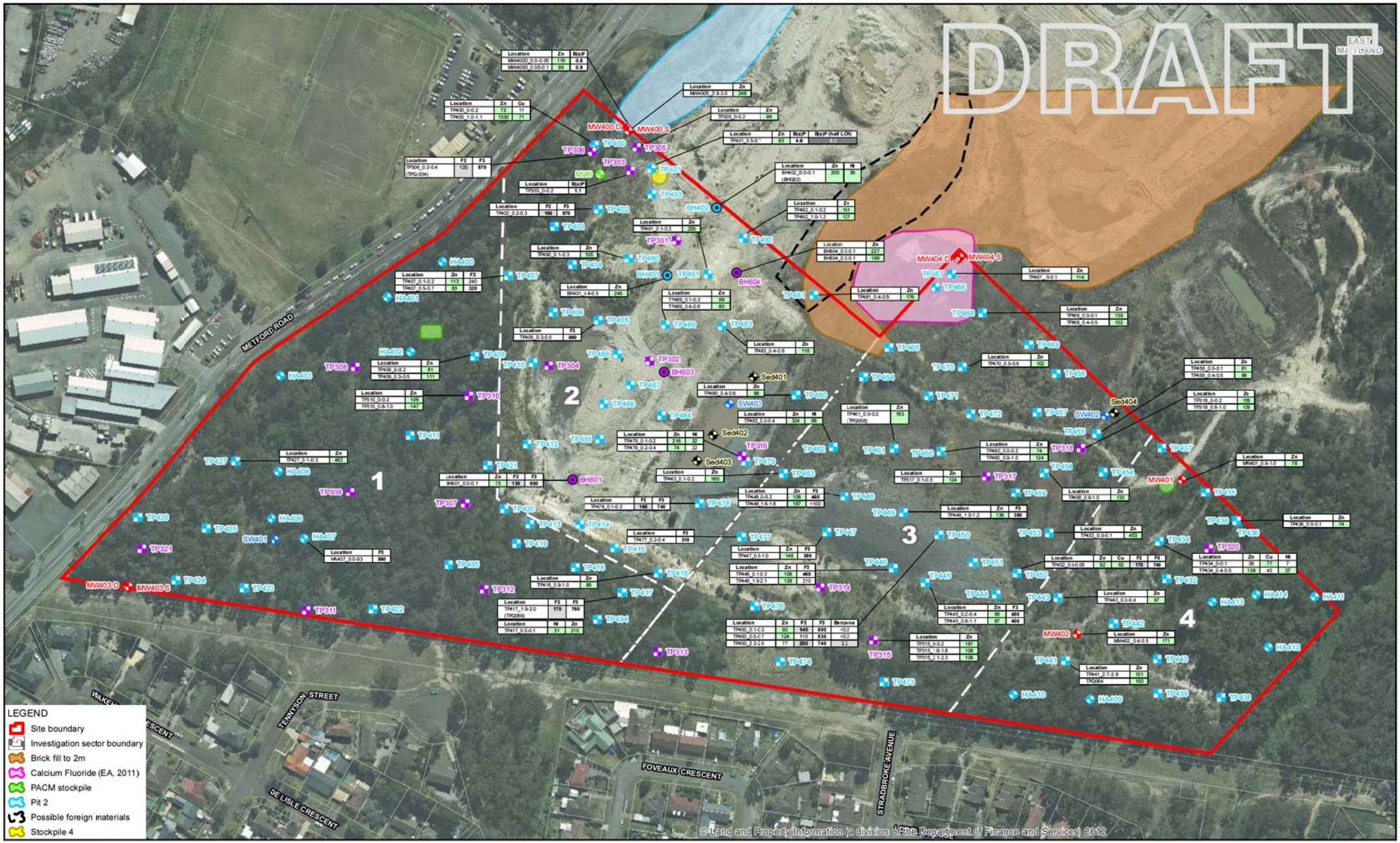
Job Number 22-18003
Revision A
Date 19 Nov 2015

Figure 3

G:\22\18003\GIS\Maps\Deliverables\SiteWorks\22218003_SW002_Topography_A.mxd

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au

Data source: ADW: Survey/Contours/Topo, 2015; HWC: Dial Before You Dig Sewermains, 2015. LPI: DTDB / DCDB / Aerial Imagery, 2012. Created by: fmackay, tmorton, gmcdiarmid



Paper Size A3

0 10 20 40 60 80

Metres

Map Projection Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

LEGEND

- Cadastre
- DP / GHD test pit
- Existing monitoring well
- GHD / DP soil bore
- GHD Hand auger
- GHD Monitoring wells
- GHD Sediment sample
- GHD Soil bore
- GHD Surface water sample
- GHD Test pit

NEPM 2013 Site Specific EIL-Urban Residential
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand[a]
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil[a]
NEPM 2013 Table 1A(1) HILs Res B Soil[a]
NEPM 2013 Table 1A(1) HILs Rec C Soil[a]
All results in mg/kg

Health Infrastructure
New Maitland Hospital, Metford
Stage 1 Development Area
Phase 2 ESA
Soil Exceedances

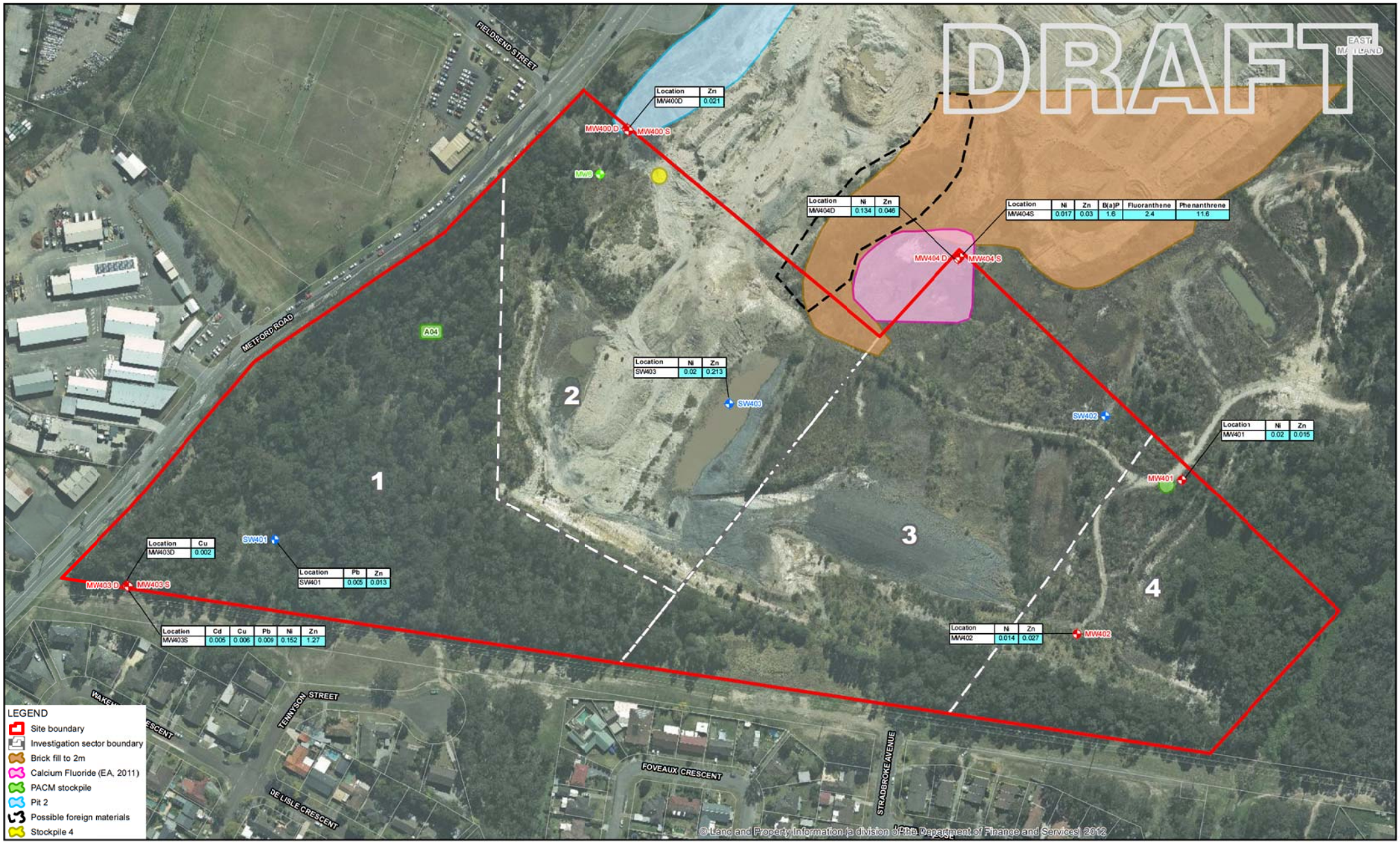
Job Number	22-18003
Revision	A
Date	19 Nov 2015

Figure 4

G:\22\18003\GIS\Maps\Deliverables\SiteWorks\2218003_SW003_SoilExceedances_A.mxd

Data source: ADW: Survey, 2015; LPI: DTDB / DCDB / Aerial Imagery, 2012. HWC: Dial Before You Dig Sewermain, 2015. Created by: fmackay, tmorton, gmcdiarmid

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntlmail@ghd.com W www.ghd.com.au



Paper Size A3

0 10 20 40 60 80

Metres

Map Projection Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

LEGEND

- Cadastre
- Existing monitoring well
- GHD Monitoring wells
- GHD Surface water sample

ANZECC 2000 FW Med-Low Reliability[1]
NERM 2013 Table 1C GILs, Fresh Waters[3]
All metal results in mg/L, all PAH results in ug/L

Health Infrastructure
New Maitland Hospital, Metford
Stage 1 Development Area
Phase 2 ESA
Water Exceedances

Job Number 22-18003
Revision A
Date 19 Nov 2015

Figure 5

G:\22\18003\GIS\Maps\Deliverables\SiteWorks\2218003_SW004_WaterExceedances_A.mxd

Data source: ADW: Survey, 2015. LPI: DTDB / DCDB / Aerial Imagery, 2012. HWC: Dial Before You Dig Sewermain, 2015. Created by: fmackay, tmorton, gmcdiarmid

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Paper Size A3

0 10 20 40 60 80

Metres

Map Projection Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

LEGEND

- Site boundary
- Investigation sector boundary
- Cadastre
- Existing monitorng well
- GHD Monitoring well (actual SWL x.xx mAHD)
- Inferred groundwater contour (m AHD)
- Inferred groundwater flow direction

Health Infrastructure
New Maitland Hospital, Metford

Stage 1 Development Area
Phase 2 ESA
Groundwater Contours - Deep Wells Figure 6

Job Number	22-18003
Revision	A
Date	04 Dec 2015

G:\22\18003\GIS\Maps\Deliverables\SiteWorks\22218003_SW005_GW_Contours_A.mxd

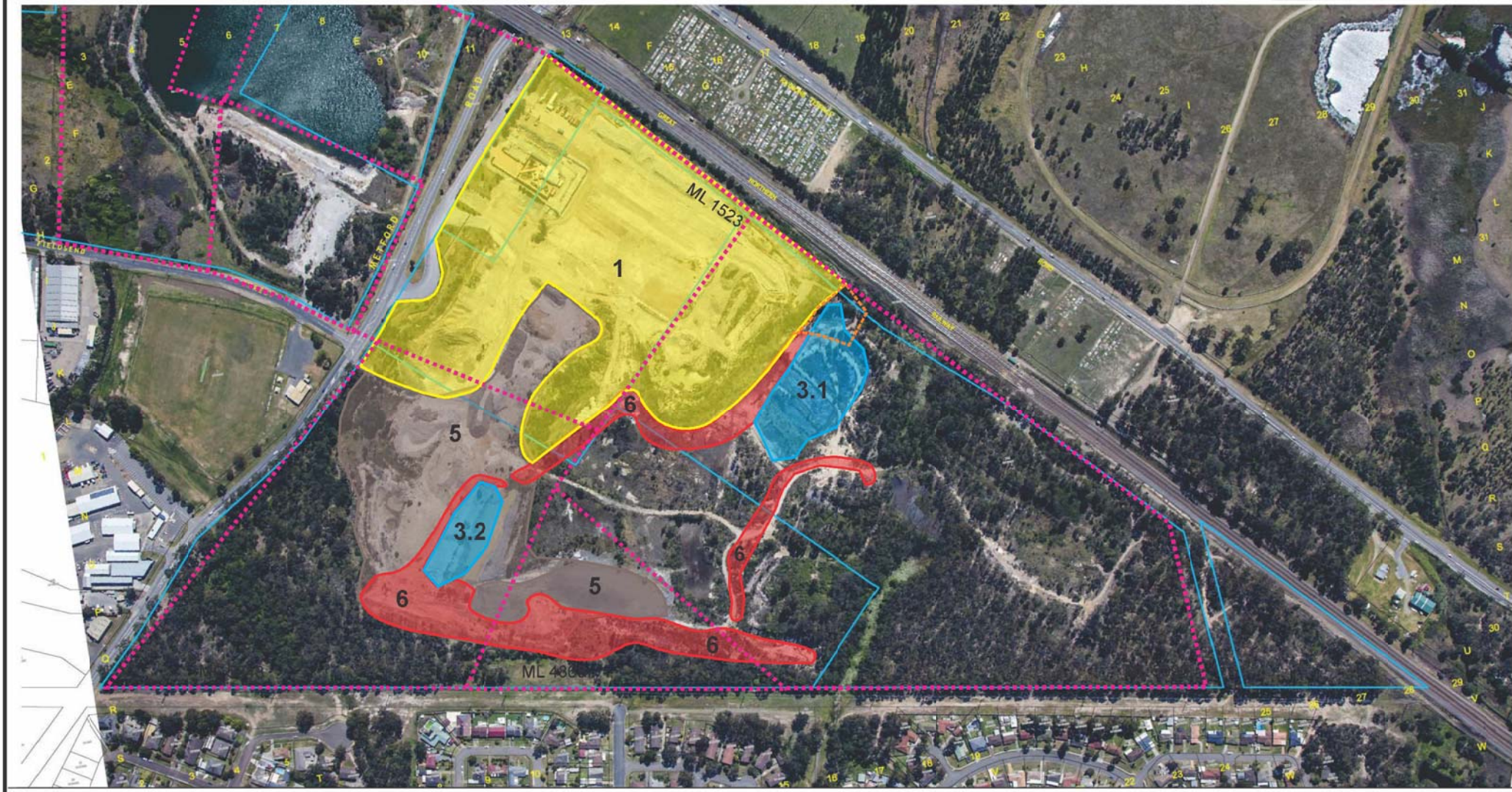
Data source: ADW: Survey, 2015 LPI: DTDB / DCDB / Aerial Imagery, 2012. HWC: Dial Before You Dig Sewermain, 2015. Created by: fmackay, tmorton, gmcdiarmid

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 **T** 61 2 4979 9999 **F** 61 2 4979 9988 **E** ntlmail@ghd.com **W** www.ghd.com.au

Plan of:	Metford Clay Mine Primary Domains (Operational)	**Location:**	Metford Clay Mine	**Source:**	Catalyst Project Consulting Boundaries not surveyed	**Our Ref:**	MT\2014\MOP 2014\Closure MOP 1400774_6\Fig3
Figure:	3	**Council:**	Maitland City Council	**Survey:**	ADW Johnson 239262-GRID-001-C	**Plan By:**	LGT
Sheet:	1 of 1	**Tenures:**	ML 1523, 5848, 4865, 5090	**Projection:**	MGA	**Project Manager:**	GVT
Version/Date:	A 9/3/2015	**Client:**	CSR Building Products Ltd	**Contour Interval:**	N/A	**Office:**	Thornton

vgt Environmental Compliance Solutions

0 40 80 120 160 200m



Legend- Primary Domains (Operational)

	1. Infrastructure Area		6. Void (open cut void)
	3. Water Management Area		
	5. Stockpiled Material		Mining Lease Boundary

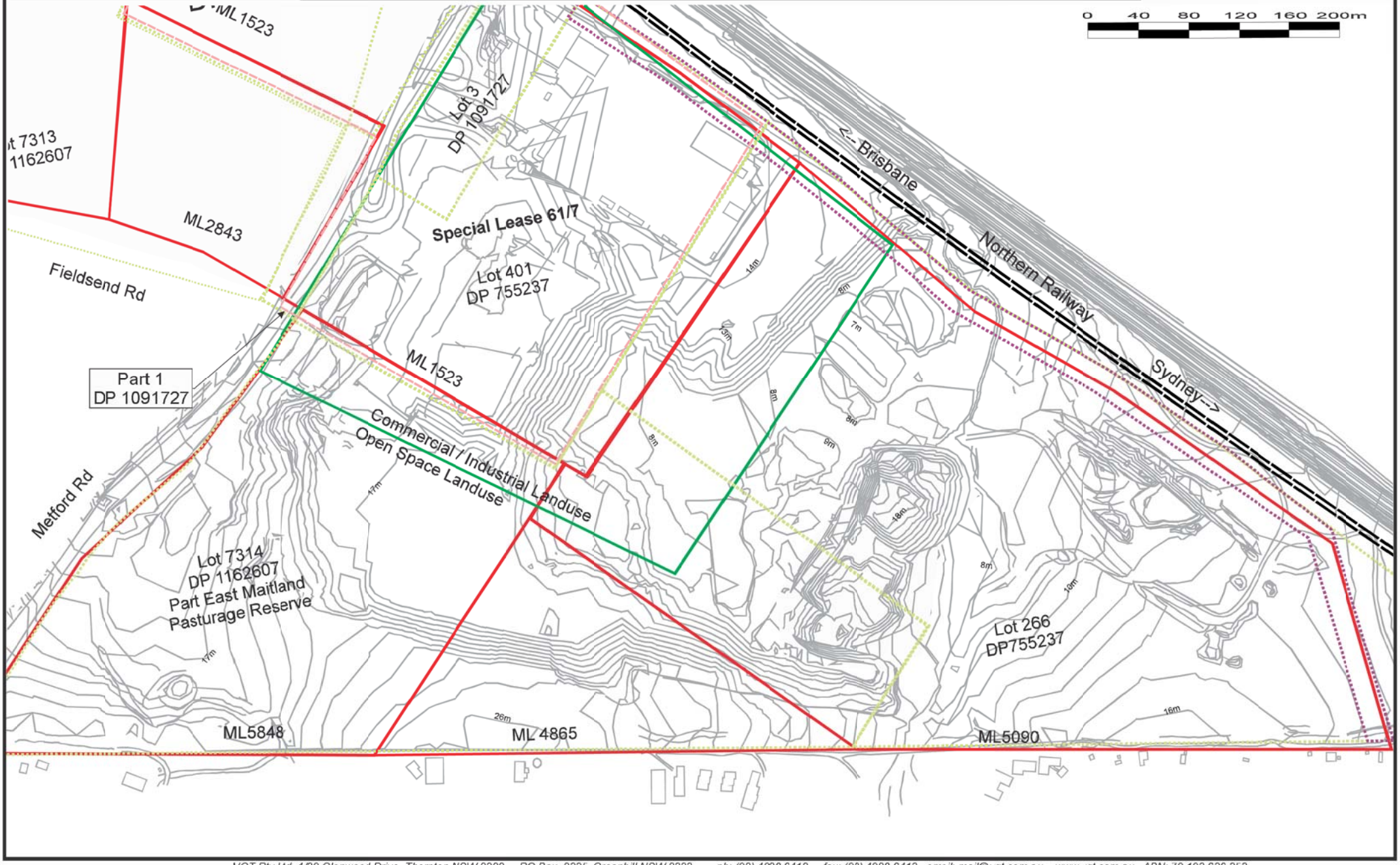
VGT Pty Ltd 4/30 Glenwood Drive, Thornton NSW 2322 PO Box 2335, Greenhills NSW 2323 ph: (02) 4028 6412 fax: (02) 4028 6413 email: mail@vgt.com.au www.vgt.com.au ABN: 79 103 636 353

Plan of:	Conceptual Final Landform	**Location:**	Metford Clay Mine	**Source:**	From Figure 11 SoEE (Ref 8) Boundaries Not Surveyed	**Our Ref:**	MT\2014\MOP 2014\Closure MOP 1400774_6\Fig5
Figure:	5	**Council:**	Maitland City Council	**Survey:**	AAM Hatch 27/2/06 1m contours	**Plan By:**	LGT
Sheet:	1 of 1	**Tenures:**	ML 1523, 5848, 4865, 5090	**Projection:**	MGA	**Project Manager:**	GVT
Version/Date:	A 9/03/2015	**Client:**	CSR Building Products Ltd	**Contour Interval:**	1m	**Office:**	Thornton **Scale:**

vgt Environmental Compliance Solutions

N

0 40 80 120 160 200m



VGT Pty Ltd 4/30 Glenwood Drive, Thornton NSW 2322 PO Box 2335, Greenhill NSW 2323 ph: (02) 4028 6412 fax: (02) 4028 6413 email: mail@vgt.com.au www.vgt.com.au ABN: 79 103 636 353

Appendix E Regulatory Search Results

Search results

Your search for:LGA: Maitland City Council

Matched 4 notices relating to 2 sites.

Search Again

Refine Search

Suburb	Address	Site Name	Notices related to this site
EAST MAITLAND	Corner Melbourne Street and Brisbane STREET	Former Gasworks Site	2 former
MAITLAND	Charles STREET	Maitland Gasworks	2 current

Page 1 of 1

30 October 2017

Search results

Your search for: **General Search** with the following criteria

Suburb - Metford

returned 1 results

Export to excel 1 of 1 Pages Search Again

Number	Name	Location	Type	Status	Issued date
10012	CSR LIMITED	METFORD ROAD, METFORD, NSW 2323	POEO licence	Surrendered	26 May 2000

30 October 2017

For business and industry ()

For local government ()

Contact us

131 555 (tel:131555)

Online (http://www.epa.nsw.gov.au/about-us/contact-us/feedback/feedback-form)

info@epa.nsw.gov.au (mailto:info@epa.nsw.gov.au)

EPA Office Locations (http://www.epa.nsw.gov.au/about-us/contact-us/locations)

In this section

List of NSW contaminated sites notified to EPA

Background

A strategy to systematically assess, prioritise and respond to notifications under Section 60 of the ***Contaminated Land Management Act 1997 (/licensing-and-regulation/legislation-and-compliance/acts-administered-by-the-epa/act-summaries#contaminted)*** (CLM Act) has been developed by the EPA. This strategy acknowledges the EPA's obligations to make information available to the public under ***Government Information (Public Access) Act 2009 (https://www.legislation.nsw.gov.au)*** .

When a site is notified to the EPA, it may be accompanied by detailed site reports where the owner has been proactive in addressing the contamination and its source. However, often there is minimal information on the nature or extent of the contamination.

For some notifications, the information indicates the contamination is securely immobilised within the site, such as under a building or carpark, and is not currently causing any offsite consequences to the community or environment. Such sites would still need to be cleaned up, but this could be done in conjunction with any subsequent building or redevelopment of the land. These sites may not require intervention under the CLM Act, but could be dealt with through the planning and development consent process.

Where indications are that the nominated site is causing actual harm to the environment or an unacceptable offsite impact (i.e. it is a 'significantly contaminated site'), the EPA would apply the regulatory provisions of the CLM Act to have the responsible polluter and/or landowner investigate and remediate the site.

As such, the sites notified to the EPA and presented in the following table are at various stages of the assessment and/or remediation process. Understanding the nature of the underlying contamination, its implications and implementing a remediation program where required, can take a considerable period of time. The tables provide an indication, in relation to each nominated site, as to the management status of that particular site. Further detailed information may be available from the EPA or the responsible landowner.

The following questions and answers may assist those interested in this issue:

Frequently asked questions

What is the difference between the 'List of NSW contaminated sites notified to EPA' and the 'Contaminated Land: Record of Notices'?

A site will be on the **Contaminated Land: Record of Notices (/your-environment/contaminated-land/notification-policy/record-of-notices)** only if the EPA has issued a regulatory notice in relation to the site under the *Contaminated Land Management Act 1997.*

The sites appearing on this 'List of NSW contaminated sites notified to the EPA' indicate that the notifiers consider that the sites are contaminated and warrant reporting to EPA. However, the contamination may or may not be significant enough to warrant regulation by the EPA. The EPA needs to review and, if necessary, obtain more information before it can make a determination as to whether the site warrants regulation.

Why does my site appear on the list?

Your site appears on the list for one or more of the following reasons

The site owner and/or the person partly or fully responsible for causing the contamination notified the EPA about the contamination under Section 60 of the *Contaminated Land Management Act 1997.* In other words, the site owner or the 'polluter' believes the site is contaminated.

The EPA has been notified via other means and is satisfied that the site is or was contaminated.

Does the list contain all contaminated sites in NSW?

No. The list only contains contaminated sites that EPA is aware of, with regard to its regulatory role under the CLM Act. An absence of a site from the list does not necessarily imply the site is not contaminated.

The EPA relies upon responsible parties to notify contaminated sites.

How are notified contaminated sites managed by the EPA?

There are different ways that the EPA manages these notified contaminated sites. First, an initial assessment is carried out by the EPA. At the completion of the initial assessment, the EPA may take one or more than one of the following management approaches:

The contamination warrants the EPA's direct regulatory intervention either under the *Contaminated Land Management Act 1997* or the ***Protection of the Environment Operations Act 1997 (/licensing-and-regulation/legislation-and-compliance/acts-administered-by-the-epa/act-summaries#poeo)*** (POEO Act), or both. Information about current or past regulatory action on this site can be found on the EPA website.

The contamination with respect to the current use or approved use of the site, as defined under the *Contaminated Land Management Act 1997,* is not significant enough that it warrants EPA regulation.

The contamination does not require EPA regulation and can be managed by a planning approval process.

The contamination is related to an operational underground petroleum storage system, such as a service station or fuel depot. The contamination may be managed under the POEO Act and the **Protection of the Environment Operation (Underground Petroleum Storage Systems) Regulation 2014 (/licensing-and-regulation/legislation-and-compliance/acts-administered-by-the-epa/regulation-summaries#upss)**.

Note: There are specific instances where contamination is managed under a specifically tailored program operated by another agency. For example the **NSW Resouces & Energy's Derelict mines program (http://www.resourcesandenergy.nsw.gov.au/miners-and-explorers/programs-and-initiatives/derelict)** and the **NSW DPI Cattle tick dip site locator (http://www.dpi.nsw.gov.au/agriculture/livestock/health/images/information-by-species/cattle/ticks/cattle-dip-site-locator)** .

The Legacy contamination management procedures for these sites will be detailed in a Memorandum of Understanding between the NSW EPA, NSW Resources and Energy and Dept. Primary Industries (Crown Lands and Biosecurity) (Note: the MoU is currently in draft).

I am the owner of a site that appears on the list. What should I do?

First of all, you should ensure the current use of the site is compatible with the site contamination. Secondly, if the site is the subject of EPA regulation, make sure you comply with the regulatory requirements, and you have considered your obligations to notify other parties who may be affected.

If you have any concerns, contact us and we may be able to offer you general advice, or direct you to accredited professionals who can assist with specific issues.

I am a prospective buyer of a site that appears on the list. What should I do?

You should seek advice from the vendor to put the contamination issue into perspective. You may need to seek independent expert advice.

The information provided in the list, particularly the EPA site management class, is meant to be indicative only, and a starting point for your own assessment. Site contamination as a legacy of past site uses is not uncommon, particularly in an urban environment. If the contamination on a site is properly remediated or managed, it may not materially impact upon the intended future use of the site. However, each site needs to be considered in context.

List of NSW contaminated sites notified to the EPA

Disclaimer

The EPA has taken all reasonable care to ensure that the information in the list of contaminated sites notified to the EPA (the list) is complete and correct. The EPA does not, however, warrant or represent that the list is free from errors or omissions or that it is exhaustive.

The EPA may, without notice, change any or all of the information in the list at any time.

You should obtain independent advice before you make any decision based on the information in the list.

The list is made available on the understanding that the EPA, its servants and agents, to the extent permitted by law, accept no responsibility for any damage, cost, loss or expense incurred by you as a result of

1. any information in the list
2. any error, omission or misrepresentation in the list
3. any malfunction or failure to function of the list
4. without limiting (2) or (3) above, any delay, failure or error in recording, displaying or updating information.

The following information, is also available in this printable document: **List of NSW Contaminated Sites Notified to the EPA as of 4 September 2017 (PDF 1.3MB) (/-/media/7D47F13D85344D028C6406AD605A4C87.ashx?la=en)**

EPA site management class	Explanation
Under assessment	The contamination is being assessed by the EPA to determine whether regulation is required. The EPA may require further information to complete the assessment. For example, the completion of management actions regulated under the planning process or *Protection of the Environment Operations Act 1997*. Alternatively, the EPA may require information via a notice issued under s77 of the *Contaminated Land Management Act 1997* or issue a Preliminary Investigation Order.
Regulation under CLM Act not required	The EPA has completed an assessment of the contamination and decided that regulation under the *Contaminated Land Management Act 1997* is not required.
Regulation being finalised	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation under the *Contaminated Land Management Act 1997*. A regulatory approach is being finalised.
Contamination currently regulated under CLM Act	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation under the *Contaminated Land Management Act 1997* (CLM Act). Management of the contamination is regulated by the EPA under the CLM Act. Regulatory notices are available on the EPA's **Contaminated Land Public Record (/prclmapp/aboutregister.aspx)**.
Contamination currently regulated under POEO Act	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation. Management of the contamination is regulated under the *Protection of the Environment Operations Act 1997* (POEO Act). The EPA's regulatory actions under the POEO Act are available on the **POEO public register (/prpoeo/index.htm)**.
Contamination being managed via the planning process (EP&A Act)	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation. The contamination of this site is managed by the consent authority under the *Environmental Planning and Assessment Act 1979* (EP&A Act) planning approval process, with EPA involvement as necessary to ensure significant contamination is adequately addressed. The consent authority is typically a local council or the Department of Planning and Environment.
Contamination formerly regulated under the CLM Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation under the *Contaminated Land Management Act 1997* (CLM Act). The contamination was addressed under the CLM Act.
Contamination formerly regulated under the POEO Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination was addressed under the *Protection of the Environment Operations Act 1997 (POEO Act).*
Contamination was addressed via the planning process (EP&A Act)	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination was addressed by the appropriate consent authority via the planning process under the *Environmental Planning and Assessment Act 1979* (EP&A Act).
Ongoing maintenance required to manage residual contamination (CLM Act)	The EPA has determined that ongoing maintenance, under the *Contaminated Land Management Act 1997* (CLM Act), is required to manage the residual contamination. Regulatory notices under the CLM Act are available on the EPA's **Contaminated Land Public Record (http://www.epa.nsw.gov.au/prclmapp/aboutregister.aspx)**.

Suburb/City	Site description and address	Activity that caused contamination	EPA site management class see explanations
ABBOTSFORD	Former Gasworks 43 St Albans STREET	Gasworks	Contamination formerly regulated under the CLM Act
ABBOTSFORD	Former Gasworks 80-81 Wymston Pde and 35 and 41 St Albans STREET	Gasworks	Regulation under CLM Act not required
ABBOTSFORD	Former Gasworks 82, 83, 84 Wymston Pde, & 37, 39, 43, 45 St Albans STREET	Gasworks	Contamination formerly regulated under the CLM Act

MARRICKVILLE	Former Mobil Service Station 384 Illawarra ROAD	Service Station	Under assessment
MARRICKVILLE	Woolworths Petrol Service Station Marrickville 490 Illawarra ROAD	Service Station	Regulation under CLM Act not required
MARRICKVILLE	Mackey Park Cnr Richardsons Crescent and Carrington ROAD	Landfill	Regulation under CLM Act not required
MARRICKVILLE	Former Dry Cleaners and Loading Dock (adjacent Lot 1 DP612551) Smidmore STREET	Other Industry	Regulation being finalised
MARRICKVILLE	Cooks River Aqueduct Thornley STREET	Unclassified	Contamination formerly regulated under the CLM Act
MARSDEN PARK	226 Grange Avenue 226 Grange AVENUE	Unclassified	Regulation under CLM Act not required
MARSFIELD	Coles Express Marsfield 189 Epping ROAD	Service Station	Under assessment
MARULAN	BP Express Marulan (Northbound) (Northbound) Hume HIGHWAY	Service Station	Regulation under CLM Act not required
MARULAN	BP Service Station (Southbound) Hume HIGHWAY	Service Station	Regulation under CLM Act not required
MARYVILLE	7-Eleven (former Mobil) Service Station 184-188 Hannell STREET	Service Station	Under assessment
MASCOT	Caltex Service Station 125 O'Riordan STREET	Service Station	Under assessment
MASCOT	Former Zinc Smelter and Paint Manufacturing Facility 163 O'Riordan STREET	Metal Industry	Regulation under CLM Act not required
MASCOT	Ing Industrial Fund (unoccupied Land and General Parking) 19-33 Kent ROAD	Landfill	Regulation under CLM Act not required
MASCOT	Mascot Pioneer Plating 25-29 Ricketty STREET	Metal Industry	Contamination currently regulated under CLM Act
MASCOT	Former Mascot Galvanising 336-348 King STREET	Metal Industry	Contamination currently regulated under CLM Act
MASCOT	Sokol Corporation 50-56 Robey STREET	Other Industry	Regulation under CLM Act not required
MASCOT	Business Centre 5-9 Ricketty STREET	Unclassified	Under assessment
MASCOT	Former Shell Service Station Mascot 746 Botany ROAD	Service Station	Contamination currently regulated under CLM Act
MASCOT	Telstra Exchange 904-922 Botany ROAD	Other Industry	Regulation under CLM Act not required
MATRAVILLE	Former Golden Fleece Terminal No1 133 -149 Beauchamp ROAD	Other Petroleum	Contamination formerly regulated under the CLM Act
MATRAVILLE	Former Golden Fleece Terminal No2 151 Beauchamp ROAD	Other Petroleum	Contamination formerly regulated under the CLM Act
MATRAVILLE	Vacant Lot 3 Wilkes AVENUE	Other Industry	Regulation under CLM Act not required
MATRAVILLE	7-Eleven Service Station Matraville 515 Bunnerong ROAD	Service Station	Under assessment
MATRAVILLE	Former Rieco Incinerator Kain AVENUE	Other Industry	Contamination being managed via the planning process (EP&A Act)
MAYFIELD	Waratah Steel Mill 23 Frith STREET	Metal Industry	Regulation under CLM Act not required
MAYFIELD	7-Eleven (Former Mobil) Service Station 412-416 Maitland ROAD	Service Station	Regulation under CLM Act not required
MAYFIELD	Shell Coles Express Service Station 63-69 Maud STREET	Service Station	Under assessment
MAYFIELD	BHP Closure Site (Hunter River Sediments) Bed Sediments of the Hunter adjacent to Lot 221 DP1013964 RIVER	Metal Industry	Contamination formerly regulated under the CLM Act

MAYFIELD	Australian Tube Mills Newcastle Site Industrial DRIVE	Metal Industry	Under assessment
MAYFIELD	OneSteel (BHP) Industrial DRIVE	Metal Industry	Contamination currently regulated under CLM Act
MAYFIELD	Newcastle Wire Mill Ingall STREET	Metal Industry	Under assessment
MAYFIELD	BHPB Supply site Lot 223 South and West - Industrial DRIVE	Metal Industry	Contamination currently regulated under CLM Act
MAYFIELD	BHP Steel River The Buffer Zone' extending directly adjacent to the Hunter River; near the Tourle Street Bridge STREET	Metal Industry	Contamination currently regulated under CLM Act
MAYFIELD WEST	Stevenson Park landfill 2/559 Maitland ROAD	Landfill	Regulation under CLM Act not required
MAYFIELD WEST	Koppers Coal Tar East of Woodstock Street and Tourle STREET	Other Industry	Contamination currently regulated under CLM Act
MAYFIELD WEST	Tourle Street Bridge Project Tourle STREET	Landfill	Regulation under CLM Act not required
MCDOUGALLS HILL	Caltex Service Station 4949 New England HIGHWAY	Service Station	Regulation under CLM Act not required
MEADOWBANK	Former Council Works Depot 2 Parsonage STREET	Unclassified	Regulation under CLM Act not required
MENAI	Caltex Service Station Menai 1 Carter Road ROAD	Service Station	Regulation under CLM Act not required
MENAI	7-Eleven (Former Mobil) Service Station Menai 289 Menai ROAD	Service Station	Regulation under CLM Act not required
MEREWETHER	Merewether Childcare Centre 2/23 Caldwell STREET	Unclassified	Regulation under CLM Act not required
MERIMBULA	Caltex Service Station 19-25 Merimbula DRIVE	Service Station	Under assessment
MERIMBULA	Former Mobil Service Station 27 Market STREET	Service Station	Regulation under CLM Act not required
MERRYLANDS	Society of St Vincent de Paul 11-19 Centenary ROAD	Other Petroleum	Regulation under CLM Act not required
MERRYLANDS	Caltex Service Station Merrylands 148 Woodville ROAD	Service Station	Under assessment
MERRYLANDS	Former Stockfeed Manufacturing Site 1-7 & 9-11 Neil STREET	Other Petroleum	Regulation under CLM Act not required
MERRYLANDS	Stockland Merrylands Court 227-259 Merrylands ROAD	Unclassified	Under assessment
MERRYLANDS	Caltex Service Station 229 Woodville ROAD	Service Station	Regulation under CLM Act not required
MERRYLANDS	7-Eleven Merrylands Service Station 295-297 Merrylands (Cnr Windsor Rd) ROAD	Service Station	Under assessment
MERRYLANDS WEST	Former Mobil Service Station 3 Centenary ROAD	Service Station	Regulation under CLM Act not required
MILLER	Caltex Service Station 86 Cartwright AVENUE	Service Station	Under assessment
MILLERS FOREST	Chichester Trunk Gravity Main water pipeline	Other Industry	Contamination currently regulated under POEO Act
MILLERS POINT	Former AGL Gasworks 30 - 34 Hickson ROAD	Gasworks	Regulation under CLM Act not required
MILLERS POINT	Former AGL Gasworks 36 Hickson ROAD	Gasworks	Contamination currently regulated under CLM Act
MILLERS POINT	Former AGL Gasworks 38 Hickson ROAD	Gasworks	Contamination being managed via the planning process (EP&A Act)
MILLERS POINT	Port Services (Moores) Facility 4 Towns PLACE	Other Petroleum	Contamination currently regulated under POEO Act

Appendix F Consultant's Summary Tables

Appendix C
Table 1
Field Measurement Results

Field ID	Sample Date	Easting	Northing	TOC[1]	Ground Level	Screened Interval Top	Screened Interval Bottom	Screened Interval Top	Screened Interval Bottom	Depth to Water	Well Depth	SWL[5]	Aquifer Geology	Water Loss During Drilling	Temperature	pH	Electrical Conductivity	Dissolved Oxygen	Oxygen Redox Potential	Sample Description
				m AHD[2]	m AHD	m bgl[3]	m bgl	m AHD	m AHD	m bTOC[4]	m bTOC	m AHD		m bTOC	°C	pH Units	uS/cm	mg/L	mV	
Groundwater																				
MW400D	23/10/2015	369303.108	6374598.202	19.17	18.55	12.00	18.00	6.55	0.55	12.64	18.52	6.54	Sandstone	10.5	20.7	6.06	3867	0.49	38	Turbid grey/brown
MW400S	23/10/2015	369304.147	6374632.674	19.28	18.26	1.30	5.80	16.96	12.46	Dry	-	-	Sandstone/Coal/Siltstone	-	-	-	-	-	-	Dry
MW401	23/10/2015	369654.882	6374412.327	9.00	8.31	7.00	12.00	1.31	-3.69	1.93	12.04	7.08	Claystone/Shale/Sandstone	7.4	20.4	7.11	8879	0.33	38	Slightly turbid brown
MW402	23/10/2015	369588.524	6374314.167	10.42	9.81	4.30	10.30	5.51	-0.49	2.71	10.82	7.71	Siltstone/Shale/Claystone/Coal/Sandstone	4	22.2	6.24	8973	0.52	70	Turbid brown
MW403D	23/10/2015	368987.526	6374343.840	21.72	21.11	16.80	22.85	4.31	-1.74	5.94	22.30	15.78	Sandstone/Siltstone/Coal/Shale	6	21.7	11.96	7011	0.35	-256	Clear
MW403S	23/10/2015	368986.635	6374344.103	21.55	21.06	4.95	8.00	16.11	13.06	2.43	8.35	19.12	Claystone/Siltstone/Shale/Coal	3.4/6.25	21.4	4.54	11128	0.40	219	Turbid brown
MW404D	23/10/2015	369513.479	6374553.664	8.65	8.13	6.00	9.00	2.13	-0.87	0.61	9.59	8.04	Claystone	6.3	19.5	5.93	4081	3.00	78	Turbid grey/brown
MW404S	23/10/2015	369512.830	6374553.330	8.83	8.10	0.30	1.00	7.80	7.10	1.23	1.58	7.60	Sandy-Clay/Claystone/Sandstone	-	-	-	-	-	-	Grey/brown. Insufficient water for measurements
Surface Water																				
SW401	23/10/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	27.7	6.22	233	0.96	67	Tanin coloured, turbid. Ponded water approx. 3 m wide, 0.2-0.3 m deep
SW402	23/10/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	27.5	7.30	1711	7.30	33	Tanin, slightly turbid. Wetlands 0.5 m deep.
SW403	27/10/2015	-	-	-	-	-	-	-	-	-	-	-	-	-	21.1	7.17	346	6.44	130	Turbid, slightly grey. Ponded water/dam 5-10 m wide, >0.5 m deep

[1] TOC = Top of Casing
[2] AHD = Australian Height Datum
[3] m bgl = metres below ground level
[4] m bTOC = metres below Top of Casing
[5] SWL = Standing Water Level

Appendix C
Table 2
Analytical Results - Soil and Sediment

									Asbestos				Anion	PFC		Inorganics		
Field_ID	Location_Code	Sampled_Date_Time	Sample_Depth_Range	Sample_Type	Lab_Report_Number	Area	Material Type*	weight of sample	Asbestos (Presence/Absence)	Weight Used for % Calculation	Asbestos Containing Material	Friable Asbestos (as Asbestos in Soil)	Fluoride	PFOA	PFOS	CEC	Moisture	pH (Lab)
								g	-	kg	g	%	mg/kg	mg/kg	mg/kg	meq/100g	%	pH Units
LOR								0.01		0.0001	0.0004	0.001	40	0.0005	0.0005	0.1	1	0.1
Toxicity derivation, and Region IX exposure factors (USEPA 2009b)[1]														16	6			
US EPA Residential Soil Screening Level[2]													3100					
NEPM 2013 Site Specific EIL-Urban Residential (Disturbed)[3]																		
NEPM 2013 Site Specific EIL-Urban Residential (Undisturbed)3																		
NEPM 2013 Table 1A(1) HILs Res A Soil[4]																		
NEPM 2013 Table 1A(1) HILs Res B Soil[4]																		
NEPM 2013 Table 1A(1) HILs Rec C Soil[4]																		
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand[5]																		
0-1m																		
1-2m																		
2-4m																		
>4m																		
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand[5]																		
0-1m																		
1-2m																		
2-4m																		
>4m																		
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil[6]																		
0-2m																		
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil[7]																		
CRCCare Soil Direct Contact HSL-A Residential (Low Density)[8]																		
CRCCare Soil Direct Contact HSL-B Residential (High Density)[8]																		
CRCCare Soil Direct Contact HSL-C Recreational / Open Space[8]																		
CRCCare Soil Direct Contact Intrusive Works[8]																		
CRCCare Soil HSL Vap Int Intrusive Works 0 to <2m Sand[10]																		
CRCCare Soil HSL Vap Int Intrusive Works 2 to <4m Sand[10]																		
A04	A04	19/10/2015	0-0.1	Normal	ES1534055			434	0	0.434	-	-	-	-	-	-	-	-
A05	A05	19/10/2015	0-0.1	Normal	ES1534055			494	0	0.494	-	-	-	-	-	-	-	-
HA400_0.5-0.7	HA400	14/10/2015	0.5-0.7	Normal	ES1533607	1	U	-	-	-	-	-	260	-	-	-	21.7	-
HA401_0.0-0.1	HA401	16/10/2015	0-0.1	Normal	ES1533824	1	D	440	0	0.44	-	-	140	-	-	-	15.9	-
HAQ01	HA401	16/10/2015	0-0.1	Field_D	ES1533824	1	D	-	-	-	-	-	160	-	-	-	13.3	-
HA402_0.0-0.1	HA402	16/10/2015	0-0.1	Normal	ES1533824	1	U	-	-	-	-	-	140	-	-	-	10.7	-
HA403_0.4-0.5	HA403	16/10/2015	0.4-0.5	Normal	ES1533824	1	U	-	-	-	-	-	70	-	-	-	10	-
HA406_0.0-0.1	HA406	16/10/2015	0-0.1	Normal	ES1533824	1	U	-	-	-	-	-	170	-	-	-	29.4	-
HA407_0.0-0.3	HA407	16/10/2015	0-0.3	Normal	ES1533824	1	U	-	-	-	-	-	120	-	-	-	7	-
HA408_0.0-0.1	HA408	16/10/2015	0-0.1	Normal	ES1533824	1	U	-	-	-	-	-	140	-	-	-	17.1	-
MW403D_0.0-0.1	MW403D	14/10/2015	0-0.1	Normal	ES1533607	1	U	-	-	-	-	-	70	-	-	0.8	7.4	4.7
MWQ07	MW403D	14/10/2015	0-0.1	Field_D	ES1533607	1	U	-	-	-	-	-	70	-	-	-	6.4	-
MW403D_0.4-0.5	MW403D	14/10/2015	0.4-0.5	Normal	ES1533607	1	U	-	-	-	-	-	220	-	-	-	22.6	-
TP307_0.4-0.6	TP307	13/10/2015	0.4-0.6	Normal	ES1533492	1	U	-	-	-	-	-	190	-	-	-	14.8	-
TP308_0-0.2	TP308	13/10/2015	0-0.2	Normal	ES1533492	1	U	-	-	-	-	-	290	-	-	-	14.8	-
TP309_0-0.1	TP309	13/10/2015	0-0.1	Normal	ES1533492	1	U	-	-	-	-	-	110	-	-	-	9	-
TP310_0-0.2	TP310	13/10/2015	0-0.2	Normal	ES1533492	1	DC	585	0	0.585	-	-	270	-	-	-	12.8	-
TP310_0.8-1.0	TP310	13/10/2015	0.8-1	Normal	ES1533492	1	DC	-	-	-	-	-	270	-	-	-	12.6	-
TPQ-007	TP310	13/10/2015	0.8-1	Field_D	ES1533492	1	DC	-	-	-	-	-	260	-	-	-	10.5	-
TPQ-008	TP310	13/10/2015	0.8-1	Interlab_D	SE144776-1	1	DC	-	-	-	-	-	200	-	-	-	13	-
TP311_0.2-0.3	TP311	14/10/2015	0.2-0.3	Normal	ES1533607	1	U	-	-	-	-	-	60	-	-	-	12	-
TP312_0-0.2	TP312	13/10/2015	0-0.2	Normal	ES1533492	1	U	-	-	-	-	-	60	-	-	-	4.5	-
TP321_0.1-0.3	TP321	14/10/2015	0.1-0.3	Normal	ES1533607	1	U	602	0	-	-	-	80	-	-	-	7.6	-
TP321_0.4-0.6	TP321	14/10/2015	0.4-0.6	Normal	ES1533607	1	U	-	-	-	-	-	190	-	-	-	20.6	-
TP409_0-0.2	TP409	16/10/2015	0-0.2	Normal	ES1533824	1	DC	596	0	0.596	-	-	230	-	-	-	10.4	-
TP409_0.3-0.5	TP409	16/10/2015	0.3-0.5	Normal	ES1533824	1	DC	-	-	-	-	-	270	-	-	-	12.2	-
TP411_0-0.2	TP411	16/10/2015	0-0.2	Normal	ES1533824	1	U	-	-	-	-	-	200	-	-	8.1	14.7	5.8
TP413_0.1-0.3	TP413	16/10/2015	0.1-0.3	Normal	ES1533824	1	DC	710	0	0.71	-	-	250	-	-	-	10.5	-
TP413_1.7-1.9	TP413	16/10/2015	1.7-1.9	Normal	ES1533824	1	DC	-	-	-	-	-	160	-	-	-	10	-
TPQ_030	TP413	16/10/2015	1.7-1.9	Field_D	ES1533824	1	DC	-	-	-	-	-	170	-	-	-	8.3	-
TPQ-031	TP413	16/10/2015	1.7-1.9	Interlab_D	SE145053-1	1	DC	-	-	-	-	-	150	-	-	-	8.6	-
TP417_0.0-0.1	TP417	23/10/2015	0-0.1	Normal	ES1534383	1	DC	-	-	-	-	-	360	-	-	-	19.3	-
TP417_1.9-2.0	TP417	23/10/2015	1.9-2	Normal	ES1534383	1	DC	-	-	-	-	-	260	-	-	-	14.9	-
TPQ068	TP417	23/10/2015	1.9-2	Field_D	ES1534383	1	DC	-	-	-	-	-	270	-	-	-	19.9	-
TPQ069	TP417	23/10/2015	1.9-2	Interlab_D	SE145313-1	1	DC	-	-	-	-	-	200	-	-	-	14	-
TP418_0-0.2	TP418	16/10/2015	0-0.2	Normal	ES1533824	1	U	-	-	-	-	-	90	-	-	-	9.1	-
TP419_0.1-0.3	TP419	16/10/2015	0.1-0.3	Normal	ES1533824	1	U	-	-	-	-	-	250	-	-	-	14.6	-
TP420_0.1-0.3	TP420	16/10/2015	0.1-0.3	Normal	ES1533824	1	D	706	0	0.706	-	-	120	-	-	-	8.8	-
TP420_2.0-2.2	TP420	16/10/2015	2-2.2	Normal	ES1533824	1	U	732	0	0.732	-	-	130	-	-	-	9.8	-
TP421_0.1-0.3	TP421	20/10/2015	0.1-0.3	Normal	ES1534055	1	DC	652	0	0.652	-	-	280	-	-	-	12.2	-
TP421_1.0-1.2	TP421	20/10/2015	1-1.2	Normal	ES1534055	1	DC	-	-	-	-	-	290	-	-	-	11.2	-
TP422_0.1-0.2	TP422	20/10/2015	0.1-0.2	Normal	ES1534055	1	U	-	-	-	-	-	120	-	-	-	17.8	-
TP422_0.3-0.5	TP422	20/10/2015	0.3-0.5	Normal	ES1534055	1	U	471	0	0.471	-	-	230	-	-	-	19.8	-
TPQ-048	TP422	20/10/2015	0.3-0.5	Field_D	ES1534055	1	U	-	-	-	-	-	200	-	-	-	20.5	-
TPQ-049	TP422	20/10/2015	0.3-0.5	Interlab_D	SE145175-1	1	U	-	-	-	-	-	190	-	-	-	20	-
TP423_0.2-0.4	TP423	20/10/2015	0.2-0.4	Normal	ES1534055	1	U	-	-	-	-	-	110	-	-	4.1	11.9	5.8
TP424_0-0.2	TP424	20/10/2015	0-0.2	Normal	ES1534055	1	U	-	-	-	-	-	220	-	-	-	19.8	-
TP425_0.6-0.8	TP425	20/10/2015	0.6-0.8	Normal	ES1534055	1	D	753	0	0.753	-	-	80	-	-	-	7.4	-
TP426_0.1-0.2	TP426	20/10/2015	0.1-0.2	Normal	ES1534055	1	U	-	-	-	-	-	90	-	-	-	7.1	-
TP427_0.1-0.3	TP427	20/10/2015	0.1-0.3	Normal	ES1534055	1	D	552	0	0.552	-	-	180	-	-	-	9.5	-
TP494_0.0-0.2	TP494	16/10/2015	0-0.2	Normal	ES1533824	1	U	570	0	0.57	-	-	170	-	-	-	6.2	-
TP495_0.1-0.2	TP495	20/10/2015	0.1-0.2	Normal	ES1534055	1	U	-	-	-	-	-	170	-	-	-	12.4	-
BH401_0.4-0.5	BH401	14/10/2015	0.4-0.5	Normal	ES1533607	2	D	-	-	-	-	-	260	-	-	-	10.6	-
BH401_2.9-3.0	BH401	14/10/2015	2.9-3	Normal	ES1533607	2	D	-	-	-	-	-	260	-	-	-	15.3	-
BH402_0.0-0.1	BH402	14/10/2015	0-0.1	Normal	ES1533607	2	DC	499	0	-	-	-	170	-	-	-	7	-
BHQ01	BH402	14/10/2015	0-0.1	Field_D	ES1533607	2	DC	-	-	-	-	-	260	-	-	-	6.8	-
BHQ02	BH402	14/10/2015	0-0.1	Interlab_D	SE145051-1	2	DC	-	-	-	-	-	260	-	-	-	7.4	-
BH402_0.9-1.0	BH402	14/10/2015	0.9-1	Normal	ES1533607	2	U	-	-	-	-	-	150	-	-	-	7	-
BH601_0.0-0.1	BH601	16/10/2015	0-0.1	Normal	ES1533824	2	DC	593	0	0.593	-	-	140	-	-	-	24.9	-
BH603_2.0-2.5	BH603	16/10/2015	2-2.5	Normal	ES1533824	2	U	-	-	-	-	-	190	-	-	-	10	-
BH604_0.0-0.1	BH604	21/10/2015	0-0.1	Normal	ES1534200	2	U	-	-	-	-	-	210	-	-	-	11.7	-
BH604_0.0-0.1	BH604	27/10/2015	0-0.1	Normal	ES1534594	2	U	483	0	0.483	-	-	200	-	-	-	12.8	-
MW400D_0.0-0.05	MW400D	12/10/2015	0-0.05	Normal	ES1533373	2	D	-	-	-	-	-	170	-	-	-	12.3	-
MW400D_0.05-0.1	MW400D	12/10/2015	0.05-0.1	Normal	ES1533373	2	DC	421	0	0.421	-	-	170	-	-	-	17	-
MWQ03	MW400D	12/10/2015	0.05-0.1	Field_D	ES1533373	2	DC	-	-	-	-	-	160	-	-	-	17.4	-
MW400S_2.9-3.0	MW400S	12/10/2015	2.9-3	Normal	ES1533373	2	UC	-	-	-	-	-	260	-	-	-	17	-
SED401_0.0-0.1	SED401	23/10/2015	0-0.1	Normal	ES1534383	2	U	-	-	-	-	-	180	-	-	-	30.1	-
SED402_0.1-0.2	SED402	23/10/2015	0.1-0.2	Normal	ES1534383	2	U	-	-	-	-	-	240	-	-	-	31.9	-
SED403_0.0-0.1	SED403	23/10/2015	0-0.1	Normal	ES1534383	2	U	-	-	-	-	-	240	-	-	-	33.9	-
TP301_0.5-0.7	TP301	12/10/2015	0.5-0.7	Normal	ES1533373	2	D	-	-	-	-	-	150	-	-	-	10.9	-
TP302_1.5-1.7	TP302	12/10/2015	1.5-1.7	Normal	ES1533373	2	D	-	-	-	-	-	210	-	-	-	9.1	-
TP303_0-0.2	TP303	12/10/2015	0-0.2	Normal	ES1533373	2	D	620	0	0.62	-	-	150	-	-	-	12.1	-
TP303_0.2-0.3	TP303	12/10/2015	0.2-0.3	Normal	ES1533373	2	DC	-	-	-	-	-	80	-	-	-	14.6	-
TP305_0-0.2	TP305	13/10/2015	0-0.2	Normal	ES1533492	2	D	436	0	0.436	-	-	270	-	-	-	15.5	-
TP306_0-0.2	TP306	12/10/2015	0-0.2	Normal	ES1533373	2	U	439	0	0.439	-	-	220	-	-	-	23.5	-
TP306_0.2-0.4	TP306	12/10/2015	0.2-0.4	Normal	ES1533373	2	UC	-	-	-	-	-	80	-	-	-	24.8	-
TPQ-003	TP306	12/10/2015	0.2-0.4	Field_D	ES1533373	2	UC	-	-	-	-	-	90	-	-	-	27	-
TPQ-004	TP306	12/10/2015	0.2-0.4	Interlab_D	SE144838-1	2	UC	-	-	-	-	-	190	-	-	-	26	-
TP400_0-0.2	TP400	15/10/2015	0-0.2	Normal	ES1533724	2	D	688	0	0.688	-	-	200	-	-	6.9	7.3	7
TP400_1.0-1.1	TP400	15/10/2015	1-1.1	Normal	ES1533724	2	D	41.9	0	0.0419	-	-	180	-	-	-	8.2	-
TP401_0.5-0.7	TP401	15/10/2015	0.5-0.7	Normal	ES1533724	2	DC	688	0	0.688	-	-	200	-	-	-	15.5	-
TP401_1.7-1.9	TP401	15/10/2015	1.7-1.9	Normal	ES1533724	2	DC	-	-	-	-	-	220	-	-	-	14.9	-
TP402_0.2-0.3	TP402	15/10/2015	0.2-0.3	Normal	ES1533724	2	D	-	-	-	-	-	260	-	-	4.6	13.1	4.7
TP403_0-0.2	TP403	19/10/2015	0-0.2	Normal	ES1533951	2	DC	543	0	0.543	-	-	180	-	-	-	15.3	-
TP403_1.1-1.3	TP403	19/10/2015	1.1-1.3	Normal	ES1533951	2	DC	468	0	0.468	-	-	70	-	-	-	25.6	-
TP404_0.6-0.8	TP404	15/10/2015	0.6-0.8	Normal	ES1533724	2	D	612	0	0.612	-	-	270	-	-	-	14.3	-
TP405_0.3-0.5	TP405	15/10/2015	0.3-0.5	Normal	ES1533724	2	UC	-	-	-	-	-	220	-	-	-	17.8	-
TP406_0.1-0.2	TP406	15/10/2015	0.1-0.2	Normal	ES1533724	2	D	-	-	-	-	-	170	-	-	-	12	-
TP407_0.1-0.2	TP407	19/10/2015	0.1-0.2	Normal	ES1533951	2	D	568	0	0.568	-	-	240	-	-	-	13	-
TP407_0.5-0.7	TP407	19/10/2015	0.5-0.7	Normal	ES1533951	2	D	-	-	-	-	-	230	-	-	-	13.6	-
TP410_0.1-0.2	TP410	15/10/2015	0.1-0.2	Normal	ES1533724	2	D	-	-	-	-	-	200	-	-	-	12	-
TP412_0.0-0.1	TP412	23/10/2015	0-0.1	Normal	ES1534383	2	D	-	-	-	-	-	180	-	-	-	14	-
TP414_0-0.2	TP414	16/10/2015	0-0.2	Normal	ES1533824	2	DC	683	0	0.683	-	-	150	-	-	-	12.2	-
TP414_0.5-0.7	TP414	16/10/2015	0.5-0.7	Normal	ES1533824	2	DC	702	0	0.702	-	-	160	-	-	-	14.4	-
TP414_1.7-1.9	TP414	16/10/2015	1.7-1.9	Normal	ES1533824	2	DC	635	0	0.635	-	-	100	-	-	-	11.3	-
TP415_0.0-0.1	TP415	23/10/2015	0-0.1	Normal	ES1534383	2	D	370	0	0.37	-	-	210	-	-	-	16.2	-
TP416_0.0-0.1	TP416	23/10/2015	0-0.1	Normal	ES1534383	2	DC	-	-	-	-	-	280	-	-	-	10.5	-
TP416_0.9-1.0	TP416	23/10/2015	0.9-1	Normal	ES1534383	2	D	468	0	0.468	-	-	180	-	-	-	7.9	-

	Metals										TRH - NEPM 2013						
Field_ID	Arsenic	Barium	Cadmium	Chromium (III+VI)	Copper	Lead	Manganese	Mercury	Nickel	Zinc	C6-C10 minus BTEX (F1)	C6 - C10 Fraction	>C10-C16 minus Naphthalene (F2)	>C10 - C16 Fraction	>C16 - C34 Fraction (F3)	>C34 - C40 Fraction (F4)	>C10 - C40 (Sum of Total)
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR	5	10	1	2	5	5	5	0.1	2	5	10	10	50	50	100	100	50
Toxicity derivation, and Region IX exposure factors (USEPA 2009b)[1]																	
US EPA Residential Soil Screening Level[2]		15,000															
NEPM 2013 Site Specific EIL-Urban Residential (Disturbed)[3]	100			190	60	1100			30	70							
NEPM 2013 Site Specific EIL-Urban Residential (Undisturbed)3	100			250	95	1100			170	180							
NEPM 2013 Table 1A(1) HILs Res A Soil[4]	100		20	100	6000	300	3800	40	400	7400							
NEPM 2013 Table 1A(1) HILs Res B Soil[4]	500		150	500	30000	1200	14000	120	1200	60000							
NEPM 2013 Table 1A(1) HILs Rec C Soil[4]	300		90	300	17000	600	19000	80	1200	30000							
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand[5]																	
0-1m											45		110				
1-2m											70		240				
2-4m											110		440				
>4m											200		NL				
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand[5]																	
0-1m											NL		NL				
1-2m											NL		NL				
2-4m											NL		NL				
>4m											NL		NL				
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil[6]																	
0-2m											**180**		**120**		**300**	**2800**	
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil[7]												700		1000	2500	10000	
CRCCare Soil Direct Contact HSL-A Residential (Low Density)[8]												4400		3300	4500	6300	
CRCCare Soil Direct Contact HSL-B Residential (High Density)[8]												5600		4200	5800	8100	
CRCCare Soil Direct Contact HSL-C Recreational / Open Space[8]												5100		3800	5300	7400	
CRCCare Soil Direct Contact Intrusive Works[8]												82000		62000	85000	120000	
CRCCare Soil HSL Vap Int Intrusive Works 0 to <2m Sand[10]												NL		NL			
CRCCare Soil HSL Vap Int Intrusive Works 2 to <4m Sand[10]												NL		NL			
A04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA400_0.5-0.7	6	360	<1	6	15	42	104	<0.1	12	95	<10	<10	<50	<50	<100	<100	<50
HA401_0.0-0.1	8	70	<1	8	10	25	129	<0.1	4	54	<10	<10	<50	<50	140	<100	140
HAQ01	8	50	<1	7	8	15	121	<0.1	<2	35	<10	<10	<50	<50	<100	<100	<50
HA402_0.0-0.1	5	40	<1	3	6	17	125	<0.1	10	68	<10	<10	<50	<50	<100	<100	<50
HA403_0.4-0.5	<5	60	<1	4	<5	9	9	<0.1	<2	14	<10	<10	<50	<50	<100	<100	<50
HA406_0.0-0.1	<5	90	<1	10	6	29	8	<0.1	<2	18	<10	<10	<50	<50	<100	<100	<50
HA407_0.0-0.3	6	160	<1	8	5	20	58	<0.1	3	40	<10	<10	110	110	**560**	280	950
HA408_0.0-0.1	6	70	<1	9	8	65	106	<0.1	4	88	<10	<10	<50	<50	190	120	310
MW403D_0.0-0.1	7	40	<1	11	7	29	22	<0.1	2	19	<10	<10	<50	<50	<100	<100	<50
MWQ07	12	40	<1	15	8	31	22	<0.1	2	22	<10	<10	<50	<50	100	<100	100
MW403D_0.4-0.5	8	20	<1	26	<5	14	<5	<0.1	<2	<5	<10	<10	<50	<50	<100	<100	<50
TP307_0.4-0.6	<5	1480	<1	4	<5	11	<5	<0.1	<2	9	<10	<10	<50	<50	<100	<100	<50
TP308_0-0.2	<5	60	<1	6	19	17	69	<0.1	8	58	<10	<10	<50	<50	<100	<100	<50
TP309_0-0.1	<5	60	<1	3	<5	18	14	<0.1	3	22	<10	<10	<50	<50	<100	<100	<50
TP310_0-0.2	6	50	<1	2	17	20	44	<0.1	11	106	<10	<10	<50	<50	110	<100	110
TP310_0.8-1.0	6	40	<1	<2	16	25	147	<0.1	14	147	<10	<10	<50	<50	<100	<100	<50
TPQ-007	5	30	<1	<2	16	21	106	<0.1	13	140	<10	<10	<50	<50	<100	<100	<50
TPQ-008	4	24	<0.3	14	13	15	87	0.04	14	120	<25	<25	<25	<25	<90	<120	<210
TP311_0.2-0.3	7	40	<1	17	<5	9	<5	<0.1	<2	<5	<10	<10	<50	<50	<100	<100	<50
TP312_0-0.2	<5	40	<1	4	<5	17	8	<0.1	<2	10	<10	<10	<50	<50	<100	<100	<50
TP321_0.1-0.3	8	50	<1	15	<5	14	11	<0.1	2	6	<10	<10	<50	<50	<100	<100	<50
TP321_0.4-0.6	11	20	<1	34	<5	11	<5	<0.1	<2	<5	<10	<10	<50	<50	<100	<100	<50
TP409_0-0.2	14	60	<1	3	17	19	45	<0.1	8	81	<10	<10	50	50	250	<100	300
TP409_0.3-0.5	9	40	<1	2	18	22	58	<0.1	12	111	<10	<10	<50	<50	<100	<100	<50
TP411_0-0.2	6	210	<1	9	<5	10	7	<0.1	3	21	<10	<10	<50	<50	<100	<100	<50
TP413_0.1-0.3	7	100	<1	6	17	19	105	<0.1	7	64	<10	<10	<50	<50	<100	<100	<50
TP413_1.7-1.9	7	120	<1	6	12	19	214	<0.1	6	53	<10	<10	<50	<50	<100	<100	<50
TPQ_030	7	110	<1	5	12	19	123	<0.1	7	59	<10	<10	<50	<50	280	<100	280
TPQ-031	6	71	<0.3	6.2	7.9	18	670	0.06	5	40	<25	<25	27	27	130	<120	<210
TP417_0.0-0.1	9	40	<1	4	47	21	182	<0.1	31	210	<10	<10	<50	<50	<100	<100	<50
TP417_1.9-2.0	5	20	<1	<2	13	16	27	<0.1	9	58	<10	<10	<50	<50	260	<100	260
TPQ068	6	20	<1	<2	13	13	21	<0.1	6	44	<10	<10	<50	<50	**310**	<100	310
TPQ069	4	22	<0.3	2.1	13	15	24	0.03	10	58	<25	<25	**170**	170	**760**	<120	940
TP418_0-0.2	<5	120	<1	6	<5	12	8	<0.1	7	30	<10	<10	<50	<50	<100	<100	<50
TP419_0.1-0.3	<5	50	<1	8	<5	11	<5	<0.1	2	11	<10	<10	<50	<50	<100	<100	<50
TP420_0.1-0.3	8	90	<1	8	10	25	66	<0.1	5	69	<10	<10	<50	<50	240	<100	240
TP420_2.0-2.2	6	110	<1	5	7	17	39	<0.1	4	30	<10	<10	<50	<50	220	<100	220
TP421_0.1-0.3	<5	80	<1	3	10	9	24	<0.1	3	26	<10	<10	<50	<50	<100	<100	<50
TP421_1.0-1.2	<5	100	<1	3	7	12	17	<0.1	4	38	<10	<10	<50	<50	<100	<100	<50
TP422_0.1-0.2	<5	20	<1	20	<5	7	<5	<0.1	<2	<5	<10	<10	<50	<50	<100	<100	<50
TP422_0.3-0.5	<5	20	<1	25	<5	8	<5	<0.1	<2	<5	<10	<10	<50	<50	<100	<100	<50
TPQ-048	6	20	<1	22	<5	8	<5	<0.1	<2	<5	<10	<10	<50	<50	<100	<100	<50
TPQ-049	6	17	0.3	20	<0.5	10	2	0.01	1	3.4	<25	<25	<25	<25	<90	<120	<210
TP423_0.2-0.4	<5	20	<1	14	<5	8	5	<0.1	<2	<5	<10	<10	<50	<50	<100	<100	<50
TP424_0-0.2	6	30	<1	16	<5	10	<5	<0.1	<2	<5	<10	<10	<50	<50	<100	<100	<50
TP425_0.6-0.8	6	30	<1	15	<5	9	<5	<0.1	<2	<5	<10	<10	<50	<50	<100	<100	<50
TP426_0.1-0.2	<5	40	<1	13	<5	13	16	<0.1	2	7	<10	<10	<50	<50	<100	<100	<50
TP427_0.1-0.3	7	100	<1	5	20	76	54	<0.1	7	482	<10	<10	<50	<50	<100	<100	<50
TP494_0.0-0.2	<5	30	<1	4	<5	11	5	<0.1	<2	11	<10	<10	<50	<50	<100	<100	<50
TP495_0.1-0.2	<5	60	<1	4	<5	16	<5	<0.1	<2	9	<10	<10	<50	<50	<100	<100	<50
BH401_0.4-0.5	8	320	<1	5	19	18	459	<0.1	30	245	<10	<10	<50	<50	<100	<100	<50
BH401_2.9-3.0	<5	90	<1	2	8	11	117	<0.1	6	43	<10	<10	<50	<50	<100	<100	<50
BH402_0.0-0.1	10	110	<1	4	19	18	199	<0.1	10	106	<10	<10	<50	<50	<100	<100	<50
BHQ01	8	100	<1	4	27	18	172	<0.1	8	92	<10	<10	<50	<50	<100	<100	<50
BHQ02	7	91	0.4	3.3	32	17	750	0.05	36	200	<25	<25	<25	<25	<90	<120	<210
BH402_0.9-1.0	<5	20	<1	<2	5	9	99	<0.1	26	155	<10	<10	<50	<50	<100	<100	<50
BH601_0.0-0.1	<5	70	<1	3	19	13	269	<0.1	9	75	<10	<10	**130**	130	**650**	100	880
BH603_2.0-2.5	<5	50	<1	2	15	12	234	<0.1	7	58	<10	<10	<50	<50	<100	<100	<50
BH604_0.0-0.1	<5	50	<1	2	6	12	424	<0.1	25	227	<10	<10	<50	<50	<100	<100	<50
BH604_0.0-0.1	6	40	<1	2	6	10	398	<0.1	22	186	<10	<10	<50	<50	<100	<100	<50
MW400D_0.0-0.05	6	140	<1	5	15	15	269	<0.1	18	116	<10	<10	<50	<50	<100	<100	<50
MW400D_0.05-0.1	7	120	<1	5	18	19	130	<0.1	17	99	<10	<10	<50	<50	<100	<100	<50
MWQ03	8	100	<1	4	14	15	71	<0.1	20	67	<10	<10	<50	<50	<100	<100	<50
MW400S_2.9-3.0	<5	20	<1	3	18	19	8	<0.1	19	248	<10	<10	<50	<50	<100	<100	<50
SED401_0.0-0.1	<5	40	<1	2	10	12	392	<0.1	21	169	<10	<10	<50	<50	<100	<100	<50
SED402_0.1-0.2	<5	50	<1	2	20	16	186	<0.1	13	85	<10	<10	<50	<50	<100	<100	<50
SED403_0.0-0.1	<5	50	<1	<2	10	11	184	<0.1	11	102	<10	<10	<50	<50	<100	<100	<50
TP301_0.5-0.7	<5	60	<1	2	<5	10	34	<0.1	4	44	<10	<10	<50	<50	<100	<100	<50
TP302_1.5-1.7	<5	70	<1	<2	14	12	463	<0.1	8	66	<10	<10	<50	<50	<100	<100	<50
TP303_0-0.2	7	70	<1	5	9	13	92	<0.1	9	61	<10	<10	<50	<50	<100	<100	<50
TP303_0.2-0.3	5	70	<1	2	12	6	39	<0.1	13	46	<10	<10	<50	<50	<100	<100	<50
TP305_0-0.2	6	100	<1	5	16	20	93	<0.1	13	96	<10	<10	<50	<50	110	<100	110
TP306_0-0.2	8	100	<1	6	19	20	76	<0.1	20	106	<10	<10	<50	<50	<100	<100	<50
TP306_0.2-0.4	<5	50	<1	2	10	<5	21	<0.1	11	37	<10	<10	<50	<50	<100	<100	<50
TPQ-003	7	70	<1	3	13	10	40	<0.1	16	64	<10	<10	<50	<50	<100	<100	<50
TPQ-004	5	46	<0.3	3.9	8.9	7	28	0.05	17	48	<25	<25	**120**	120	**670**	<120	720
TP400_0-0.2	6	90	<1	3	11	17	128	<0.1	7	72	<10	<10	<50	<50	<100	<100	<50
TP400_1.0-1.1	9	130	<1	6	71	92	376	<0.1	7	1330	<10	<10	<50	<50	<100	<100	<50
TP401_0.5-0.7	7	110	<1	7	22	31	173	<0.1	10	83	<10	<10	<50	<50	190	<100	190
TP401_1.7-1.9	6	90	<1	5	10	15	39	<0.1	7	67	<10	<10	<50	<50	<100	<100	<50
TP402_0.2-0.3	11	20	<1	2	13	25	37	<0.1	8	58	14	14	**160**	160	**870**	150	1180
TP403_0-0.2	6	90	<1	4	9	14	119	<0.1	5	36	<10	<10	<50	<50	<100	<100	<50
TP403_1.1-1.3	<5	170	<1	5	20	11	256	<0.1	25	66	<10	<10	<50	<50	<100	<100	<50
TP404_0.6-0.8	6	90	<1	3	8	10	26	<0.1	<2	21	<10	<10	<50	<50	<100	<100	<50
TP405_0.3-0.5	7	70	<1	<2	32	14	31	<0.1	8	74	<10	<10	110	110	**660**	<100	770
TP406_0.1-0.2	<5	50	<1	2	5	10	99	<0.1	5	41	<10	<10	<50	<50	<100	<100	<50
TP407_0.1-0.2	8	90	<1	4	15	17	365	<0.1	13	113	<10	<10	<50	<50	240	<100	240
TP407_0.5-0.7	7	80	<1	4	14	16	250	<0.1	10	83	<10	<10	70	70	**320**	<100	390
TP410_0.1-0.2	6	180	<1	8	12	16	27	<0.1	3	17	<10	<10	<50	<50	<100	<100	<50
TP412_0.0-0.1	<5	40	<1	7	<5	14	<5	<0.1	3	8	<10	<10	<50	<50	<100	<100	<50
TP414_0-0.2	5	70	<1	3	5	13	46	<0.1	3	27	<10	<10	<50	<50	<100	<100	<50
TP414_0.5-0.7	<5	120	<1	4	<5	10	20	<0.1	<2	12	<10	<10	<50	<50	<100	<100	<50
TP414_1.7-1.9	<5	70	<1	4	6	22	136	<0.1	4	31	<10	<10	<50	<50	<100	<100	<50
TP415_0.0-0.1	<5	90	<1	4	<5	16	80	<0.1	3	32	<10	<10	<50	<50	<100	<100	<50
TP416_0.0-0.1	5	190	<1	6	<5	13	102	<0.1	4	46	<10	<10	<50	<50	<100	<100	<50
TP416_0.9-1.0	5	70	<1	3	10	21	352	<0.1	7	88	<10	<10	<50	<50	<100	<100	<50

	BTEX							PAH						
Field_ID	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	Pyrene	Acenaphthene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo[b+j]fluoranthene	Benzo(k)fluoranthene
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR	0.2	0.5	0.5	0.5	0.5	0.5	0.2	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Toxicity derivation, and Region IX exposure factors (USEPA 2009b)[1]														
US EPA Residential Soil Screening Level[2]														
NEPM 2013 Site Specific EIL-Urban Residential (Disturbed)[3]														
NEPM 2013 Site Specific EIL-Urban Residential (Undisturbed)3														
NEPM 2013 Table 1A(1) HILs Res A Soil[4]														
NEPM 2013 Table 1A(1) HILs Res B Soil[4]														
NEPM 2013 Table 1A(1) HILs Rec C Soil[4]														
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand[5]														
0-1m	0.5	160	55			40								
1-2m	0.5	220	NL			60								
2-4m	0.5	310	NL			95								
>4m	0.5	540	NL			170								
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand[5]														
0-1m	NL	NL	NL			NL								
1-2m	NL	NL	NL			NL								
2-4m	NL	NL	NL			NL								
>4m	NL	NL	NL			NL								
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil[6]														
0-2m	**50**	**85**	**70**			**105**						**0.7**		
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil[7]														
CRCCare Soil Direct Contact HSL-A Residential (Low Density)[8]	100	14000	4500			12000								
CRCCare Soil Direct Contact HSL-B Residential (High Density)[8]	140	21000	5900			17000								
CRCCare Soil Direct Contact HSL-C Recreational / Open Space[8]	120	18000	5300			15000								
CRCCare Soil Direct Contact Intrusive Works[8]	1100	120000	85000			130000								
CRCCare Soil HSL Vap Int Intrusive Works 0 to <2m Sand[10]	77	NL	NL			NL								
CRCCare Soil HSL Vap Int Intrusive Works 2 to <4m Sand[10]	160	NL	NL			NL								
A04	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A05	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HA400_0.5-0.7	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
HA401_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
HAQ01	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
HA402_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
HA403_0.4-0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
HA406_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
HA407_0.0-0.3	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
HA408_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	1.1	<0.5	<0.5	<0.5	0.5	0.7	<0.5
MW403D_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
MWQ07	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
MW403D_0.4-0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP307_0.4-0.6	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP308_0-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP309_0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP310_0-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP310_0.8-1.0	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TPQ-007	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TPQ-008	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	0.2	<0.1	<0.1	<0.1	<0.1	0.1	<0.1
TP311_0.2-0.3	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP312_0-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP321_0.1-0.3	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP321_0.4-0.6	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP409_0-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP409_0.3-0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP411_0-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP413_0.1-0.3	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP413_1.7-1.9	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TPQ_030	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TPQ-031	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	0.2	<0.1	<0.1	0.2	<0.1	0.1	<0.1
TP417_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP417_1.9-2.0	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TPQ068	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TPQ069	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	0.8	<0.2	<0.1	0.8	0.2	0.2	0.1
TP418_0-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP419_0.1-0.3	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP420_0.1-0.3	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP420_2.0-2.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP421_0.1-0.3	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP421_1.0-1.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP422_0.1-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP422_0.3-0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TPQ-048	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TPQ-049	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TP423_0.2-0.4	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP424_0-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP425_0.6-0.8	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP426_0.1-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP427_0.1-0.3	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	1.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP494_0.0-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP495_0.1-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH401_0.4-0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH401_2.9-3.0	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH402_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	1.4	<0.5	<0.5	0.8	0.7	1	<0.5
BHQ01	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BHQ02	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	0.5	<0.1	<0.1	0.3	0.2	0.3	0.1
BH402_0.9-1.0	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH601_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH603_2.0-2.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH604_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
BH604_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
MW400D_0.0-0.05	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	2.3	<0.5	<0.5	0.9	**0.8**	1	<0.5
MW400D_0.05-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	3.4	<0.5	<0.5	1.4	**0.9**	1.8	0.7
MWQ03	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	2.8	<0.5	<0.5	1.2	<0.5	0.9	<0.5
MW400S_2.9-3.0	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SED401_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SED402_0.1-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SED403_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP301_0.5-0.7	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP302_1.5-1.7	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP303_0-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	2.8	<0.5	<0.5	1.2	**1.1**	1.6	0.7
TP303_0.2-0.3	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	1	<0.5	<0.5	0.5	<0.5	<0.5	<0.5
TP305_0-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP306_0-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP306_0.2-0.4	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TPQ-003	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TPQ-004	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	0.6	<0.1	<0.1	0.6	0.1	0.3	<0.1
TP400_0-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP400_1.0-1.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP401_0.5-0.7	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	11.6	0.6	1.6	4.3	**4.6**	5.2	2
TP401_1.7-1.9	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP402_0.2-0.3	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	1.2	<0.5	<0.5	0.6	<0.5	<0.5	<0.5
TP403_0-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP403_1.1-1.3	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP404_0.6-0.8	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP405_0.3-0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	0.9	<0.5	<0.5	0.5	<0.5	<0.5	<0.5
TP406_0.1-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP407_0.1-0.2	<0.2	<0.5	<0.5	<0.5	0.6	0.6	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP407_0.5-0.7	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP410_0.1-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP412_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP414_0-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP414_0.5-0.7	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP414_1.7-1.9	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP415_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP416_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP416_0.9-1.0	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

	PAH												
Field_ID	Benzo(g,h,i)perylene	Chrysene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	PAHs (Sum of detections)	Benzo(a)pyrene TEQ (zero) - Lab Calc	Benzo(a)pyrene TEQ (half LOR) - Lab Calc	Benzo(a)pyrene TEQ (LOR) - Lab Calc	Benzo(a)pyrene TEQ (lower bound) *	Benzo(a)pyrene TEQ (upper bound) *
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR	0.5	0.5	0.5	0.5	0.5	0.5	0.5	-	0.5	0.5	0.5	0.5	0.5
Toxicity derivation, and Region IX exposure factors (USEPA 2009b)[1]													
US EPA Residential Soil Screening Level[2]													
NEPM 2013 Site Specific EIL-Urban Residential (Disturbed)[3]						170							
NEPM 2013 Site Specific EIL-Urban Residential (Undisturbed)3						170							
NEPM 2013 Table 1A(1) HILs Res A Soil[4]								300	3	3	3		
NEPM 2013 Table 1A(1) HILs Res B Soil[4]								400	4	4	4		
NEPM 2013 Table 1A(1) HILs Rec C Soil[4]								300	3	3	3		
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand[5]													
0-1m						3							
1-2m						NL							
2-4m						NL							
>4m						NL							
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand[5]													
0-1m						NL							
1-2m						NL							
2-4m						NL							
>4m						NL							
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil[6]													
0-2m													
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil[7]													
CRCCare Soil Direct Contact HSL-A Residential (Low Density)[8]						1400							
CRCCare Soil Direct Contact HSL-B Residential (High Density)[8]						2200							
CRCCare Soil Direct Contact HSL-C Recreational / Open Space[8]						1900							
CRCCare Soil Direct Contact Intrusive Works[8]						29000							
CRCCare Soil HSL Vap Int Intrusive Works 0 to <2m Sand[10]						NL							
CRCCare Soil HSL Vap Int Intrusive Works 2 to <4m Sand[10]						NL							
A04	-	-	-	-	-	-	-	-	-	-	-	-	-
A05	-	-	-	-	-	-	-	-	-	-	-	-	-
HA400_0.5-0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
HA401_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
HAQ01	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
HA402_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
HA403_0.4-0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
HA406_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
HA407_0.0-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
HA408_0.0-0.1	0.5	0.6	1.2	<0.5	<0.5	<0.5	<0.5	4.6	-	0.9	-	0.6	1.2
MW403D_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
MWQ07	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
MW403D_0.4-0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP307_0.4-0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP308_0-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP309_0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP310_0-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP310_0.8-1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TPQ-007	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TPQ-008	<0.1	0.2	0.1	<0.1	<0.1	<0.1	0.4	1.4	-	<0.2	-	-	<0.3
TP311_0.2-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP312_0-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP321_0.1-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP321_0.4-0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP409_0-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	0.7	-	0.6	-	<0.5	1.2
TP409_0.3-0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP411_0-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP413_0.1-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP413_1.7-1.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TPQ_030	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TPQ-031	<0.1	0.2	0.3	<0.1	<0.1	<0.1	0.3	1.5	-	<0.2	-	-	<0.3
TP417_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	0.6	-	0.6	-	<0.5	1.2
TP417_1.9-2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TPQ068	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TPQ069	<0.1	0.6	0.8	<0.2	<0.1	<0.1	1.3	5.1	-	0.3	-	-	0.4
TP418_0-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP419_0.1-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP420_0.1-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP420_2.0-2.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP421_0.1-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP421_1.0-1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP422_0.1-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP422_0.3-0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TPQ-048	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TPQ-049	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.8	-	<0.2	-	-	<0.3
TP423_0.2-0.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP424_0-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP425_0.6-0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP426_0.1-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP427_0.1-0.3	<0.5	<0.5	1.8	<0.5	<0.5	<0.5	1.8	5.3	-	0.6	-	<0.5	1.2
TP494_0.0-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP495_0.1-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
BH401_0.4-0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
BH401_2.9-3.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
BH402_0.0-0.1	<0.5	0.9	1.4	<0.5	<0.5	<0.5	1.1	7.3	-	1.2	-	0.9	1.5
BHQ01	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	1	2.4	-	0.6	-	<0.5	1.2
BHQ02	<0.1	0.3	0.6	<0.1	<0.1	<0.1	0.8	3.9	-	0.3	-	-	0.3
BH402_0.9-1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
BH601_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.1	1.7	-	0.6	-	<0.5	1.2
BH603_2.0-2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
BH604_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-
BH604_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
MW400D_0.0-0.05	0.6	0.9	2.4	<0.5	<0.5	<0.5	1.3	10.2	-	1.3	-	1	1.6
MW400D_0.05-0.1	0.6	1.5	4	<0.5	0.6	<0.5	2.1	17	-	1.6	-	1.4	1.9
MWQ03	<0.5	1.2	3.4	<0.5	<0.5	<0.5	2.8	12.3	-	0.8	-	<0.5	1.3
MW400S_2.9-3.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
SED401_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
SED402_0.1-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
SED403_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP301_0.5-0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP302_1.5-1.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP303_0-0.2	0.8	1.3	3	<0.5	0.6	<0.5	1.5	14.6	-	1.8	-	1.5	2
TP303_0.2-0.3	<0.5	0.7	1.4	<0.5	<0.5	<0.5	1.9	5.5	-	0.6	-	<0.5	1.2
TP305_0-0.2	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	0.6	1.7	-	0.6	-	<0.5	1.2
TP306_0-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	0.7	-	0.6	-	<0.5	1.2
TP306_0.2-0.4	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	1.1	2.5	-	0.6	-	<0.5	1.2
TPQ-003	<0.5	<0.5	0.8	<0.5	<0.5	<0.5	1.2	2.6	-	0.6	-	<0.5	1.2
TPQ-004	<0.1	0.5	0.9	<0.1	<0.1	<0.1	1.4	5.6	-	0.3	-	-	0.3
TP400_0-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP400_1.0-1.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP401_0.5-0.7	2	4.2	12.3	0.8	1.8	<0.5	7	58	-	6.2	-	6	6.5
TP401_1.7-1.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	1.3	-	0.6	-	<0.5	1.2
TP402_0.2-0.3	<0.5	0.7	0.9	<0.5	<0.5	<0.5	2.3	5.7	-	0.6	-	<0.5	1.2
TP403_0-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP403_1.1-1.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP404_0.6-0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP405_0.3-0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	1.2	3.1	-	0.6	-	<0.5	1.2
TP406_0.1-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP407_0.1-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	0.9 - 1	<0.5	0.9	-	0.6	-	<0.5	1.2
TP407_0.5-0.7	<0.5	<0.5	<0.5	<0.5	<0.5	1 - 1.3	<0.5	1.3	-	0.6	-	<0.5	1.2
TP410_0.1-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP412_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP414_0-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP414_0.5-0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP414_1.7-1.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP415_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP416_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP416_0.9-1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2

	OC Pesticides									PCBs
Field_ID	Aldrin + Dieldrin	chlordane	4,4 DDT	DDT+DDE+DDD - Lab Calc	Endosulfan	Endrin	Heptachlor	Hexachlorobenzene	Methoxychlor	PCBs (Total)
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR	0.05	0.05	0.2	0.05	0.05	0.05	0.05	0.05	0.2	0.1
Toxicity derivation, and Region IX exposure factors (USEPA 2009b)[1]										
US EPA Residential Soil Screening Level[2]										
NEPM 2013 Site Specific EIL-Urban Residential (Disturbed)[3]			180	180						
NEPM 2013 Site Specific EIL-Urban Residential (Undisturbed)3			180	180						
NEPM 2013 Table 1A(1) HILs Res A Soil[4]	6	50		240	270	10	6	10	300	1
NEPM 2013 Table 1A(1) HILs Res B Soil[4]	10	90		600	400	20	10	15	500	1
NEPM 2013 Table 1A(1) HILs Rec C Soil[4]	10	70		400	340	20	10	10	400	1
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand[5] (0-1m, 1-2m, 2-4m, >4m)										
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand[5] (0-1m, 1-2m, 2-4m, >4m)										
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil[6] (0-2m)										
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil[7]										
CRCCare Soil Direct Contact HSL-A / HSL-B / HSL-C / Intrusive Works[8]										
CRCCare Soil HSL Vap Int Intrusive Works 0 to <2m / 2 to <4m Sand[10]										
A04	-	-	-	-	-	-	-	-	-	-
A05	-	-	-	-	-	-	-	-	-	-
HA400_0.5-0.7	-	-	-	-	-	-	-	-	-	-
HA401_0.0-0.1	-	-	-	-	-	-	-	-	-	-
HAQ01	-	-	-	-	-	-	-	-	-	-
HA402_0.0-0.1	-	-	-	-	-	-	-	-	-	-
HA403_0.4-0.5	-	-	-	-	-	-	-	-	-	-
HA406_0.0-0.1	-	-	-	-	-	-	-	-	-	-
HA407_0.0-0.3	-	-	-	-	-	-	-	-	-	-
HA408_0.0-0.1	-	-	-	-	-	-	-	-	-	-
MW403D_0.0-0.1	-	-	-	-	-	-	-	-	-	-
MWQ07	-	-	-	-	-	-	-	-	-	-
MW403D_0.4-0.5	-	-	-	-	-	-	-	-	-	-
TP307_0.4-0.6	-	-	-	-	-	-	-	-	-	-
TP308_0-0.2	-	-	-	-	-	-	-	-	-	-
TP309_0-0.1	-	-	-	-	-	-	-	-	-	-
TP310_0-0.2	-	-	-	-	-	-	-	-	-	-
TP310_0.8-1.0	-	-	-	-	-	-	-	-	-	-
TPQ-007	-	-	-	-	-	-	-	-	-	-
TPQ-008	-	-	-	-	-	-	-	-	-	-
TP311_0.2-0.3	-	-	-	-	-	-	-	-	-	-
TP312_0-0.2	-	-	-	-	-	-	-	-	-	-
TP321_0.1-0.3	-	-	-	-	-	-	-	-	-	-
TP321_0.4-0.6	-	-	-	-	-	-	-	-	-	-
TP409_0-0.2	-	-	-	-	-	-	-	-	-	-
TP409_0.3-0.5	-	-	-	-	-	-	-	-	-	-
TP411_0-0.2	-	-	-	-	-	-	-	-	-	-
TP413_0.1-0.3	-	-	-	-	-	-	-	-	-	-
TP413_1.7-1.9	-	-	-	-	-	-	-	-	-	-
TPQ_030	-	-	-	-	-	-	-	-	-	-
TPQ-031	-	-	-	-	-	-	-	-	-	-
TP417_0.0-0.1	-	-	-	-	-	-	-	-	-	-
TP417_1.9-2.0	-	-	-	-	-	-	-	-	-	-
TPQ068	-	-	-	-	-	-	-	-	-	-
TPQ069	-	-	-	-	-	-	-	-	-	-
TP418_0-0.2	-	-	-	-	-	-	-	-	-	-
TP419_0.1-0.3	-	-	-	-	-	-	-	-	-	-
TP420_0.1-0.3	-	-	-	-	-	-	-	-	-	-
TP420_2.0-2.2	-	-	-	-	-	-	-	-	-	-
TP421_0.1-0.3	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1
TP421_1.0-1.2	-	-	-	-	-	-	-	-	-	-
TP422_0.1-0.2	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1
TP422_0.3-0.5	-	-	-	-	-	-	-	-	-	-
TPQ-048	-	-	-	-	-	-	-	-	-	-
TPQ-049	-	-	-	-	-	-	-	-	-	-
TP423_0.2-0.4	-	-	-	-	-	-	-	-	-	-
TP424_0-0.2	-	-	-	-	-	-	-	-	-	-
TP425_0.6-0.8	-	-	-	-	-	-	-	-	-	-
TP426_0.1-0.2	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1
TP427_0.1-0.3	-	-	-	-	-	-	-	-	-	-
TP494_0.0-0.2	-	-	-	-	-	-	-	-	-	-
TP495_0.1-0.2	-	-	-	-	-	-	-	-	-	-
BH401_0.4-0.5	-	-	-	-	-	-	-	-	-	-
BH401_2.9-3.0	-	-	-	-	-	-	-	-	-	-
BH402_0.0-0.1	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1
BHQ01	-	-	-	-	-	-	-	-	-	-
BHQ02	-	-	-	-	-	-	-	-	-	-
BH402_0.9-1.0	-	-	-	-	-	-	-	-	-	-
BH601_0.0-0.1	-	-	-	-	-	-	-	-	-	-
BH603_2.0-2.5	-	-	-	-	-	-	-	-	-	-
BH604_0.0-0.1	-	-	-	-	-	-	-	-	-	-
BH604_0.0-0.1	-	-	-	-	-	-	-	-	-	-
MW400D_0.0-0.05	-	-	-	-	-	-	-	-	-	-
MW400D_0.05-0.1	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1
MWQ03	-	-	-	-	-	-	-	-	-	-
MW400S_2.9-3.0	-	-	-	-	-	-	-	-	-	-
SED401_0.0-0.1	-	-	-	-	-	-	-	-	-	-
SED402_0.1-0.2	-	-	-	-	-	-	-	-	-	-
SED403_0.0-0.1	-	-	-	-	-	-	-	-	-	-
TP301_0.5-0.7	-	-	-	-	-	-	-	-	-	-
TP302_1.5-1.7	-	-	-	-	-	-	-	-	-	-
TP303_0-0.2	-	-	-	-	-	-	-	-	-	-
TP303_0.2-0.3	-	-	-	-	-	-	-	-	-	-
TP305_0-0.2	-	-	-	-	-	-	-	-	-	-
TP306_0-0.2	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1
TP306_0.2-0.4	-	-	-	-	-	-	-	-	-	-
TPQ-003	-	-	-	-	-	-	-	-	-	-
TPQ-004	-	-	-	-	-	-	-	-	-	-
TP400_0-0.2	-	-	-	-	-	-	-	-	-	-
TP400_1.0-1.1	-	-	-	-	-	-	-	-	-	-
TP401_0.5-0.7	-	-	-	-	-	-	-	-	-	-
TP401_1.7-1.9	-	-	-	-	-	-	-	-	-	-
TP402_0.2-0.3	-	-	-	-	-	-	-	-	-	-
TP403_0-0.2	-	-	-	-	-	-	-	-	-	-
TP403_1.1-1.3	-	-	-	-	-	-	-	-	-	-
TP404_0.6-0.8	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	1.14	<0.2	<0.1
TP405_0.3-0.5	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1
TP406_0.1-0.2	-	-	-	-	-	-	-	-	-	-
TP407_0.1-0.2	-	-	-	-	-	-	-	-	-	-
TP407_0.5-0.7	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1
TP410_0.1-0.2	-	-	-	-	-	-	-	-	-	-
TP412_0.0-0.1	-	-	-	-	-	-	-	-	-	-
TP414_0-0.2	-	-	-	-	-	-	-	-	-	-
TP414_0.5-0.7	-	-	-	-	-	-	-	-	-	-
TP414_1.7-1.9	-	-	-	-	-	-	-	-	-	-
TP415_0.0-0.1	-	-	-	-	-	-	-	-	-	-
TP416_0.0-0.1	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1
TP416_0.9-1.0	-	-	-	-	-	-	-	-	-	-

Appendix C
Table 2
Analytical Results - Soil and Sediment

Field_ID	Location_Code	Sampled_Date_Time	Sample_Depth_Range	Sample_Type	Lab_Report_Number	Area	Material Type	weight of sample	Asbestos: Asbestos (Presence/Absence)	Asbestos: Weight Used for % Calculation	Asbestos: Asbestos Containing Material	Asbestos: Friable Asbestos (as Asbestos in Soil)	Anion: Fluoride	PFC: PFOA	PFC: PFOS	Inorganics: CEC	Inorganics: Moisture	Inorganics: pH (Lab)
								g	-	kg	g	%	mg/kg	mg/kg	mg/kg	meq/100g	%	pH Units
LOR								0.01		0.0001	0.0004	0.001	40	0.0005	0.0005	0.1	1	0.1
Toxicity derivation, and Region IX exposure factors (USEPA 2009b)[1]														16	6			
US EPA Residential Soil Screening Level[2]													3100					
NEPM 2013 Site Specific EIL-Urban Residential (Disturbed)[3]																		
NEPM 2013 Site Specific EIL-Urban Residential (Undisturbed)3																		
NEPM 2013 Table 1A(1) HILs Res A Soil[4]																		
NEPM 2013 Table 1A(1) HILs Res B Soil[4]																		
NEPM 2013 Table 1A(1) HILs Rec C Soil[4]																		
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand[5]																		
0-1m																		
1-2m																		
2-4m																		
>4m																		
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand[5]																		
0-1m																		
1-2m																		
2-4m																		
>4m																		
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil[6]																		
0-2m																		
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil[7]																		
CRCCare Soil Direct Contact HSL-A Residential (Low Density)[8]																		
CRCCare Soil Direct Contact HSL-B Residential (High Density)[8]																		
CRCCare Soil Direct Contact HSL-C Recreational / Open Space[8]																		
CRCCare Soil Direct Contact Intrusive Works[9]																		
CRCCare Soil HSL Vap Int Intrusive Works 0 to <2m Sand[10]																		
CRCCare Soil HSL Vap Int Intrusive Works 2 to <4m Sand[10]																		
TP478_0.1-0.3	TP478	16/10/2015	0.1-0.3	Normal	ES1533824	2	UC	-	-	-	-	-	260	-	-	-	10.1	-
TP479_0.1-0.2	TP479	14/10/2015	0.1-0.2	Normal	ES1533607	2	DC	-	-	-	-	-	260	-	-	-	16.4	-
TP479_0.2-0.4	TP479	14/10/2015	0.2-0.4	Normal	ES1533607	2	DC	-	-	-	-	-	110	<0.0005	<0.0005	-	5	-
TPQ-016	TP479	14/10/2015	0.2-0.4	Field_D	ES1533607	2	DC	-	-	-	-	-	80	-	-	-	6.7	-
TP480_0.4-0.6	TP480	19/10/2015	0.4-0.6	Normal	ES1533951	2	DC	-	-	-	-	-	230	<0.0005	<0.0005	12	18.8	5.2
TP481_0.4-0.5	TP481	23/10/2015	0.4-0.5	Normal	ES1534383	2	DC	332	0	0.332	-	-	220	-	-	-	24.6	-
TP483_0.1-0.3	TP483	15/10/2015	0.1-0.3	Normal	ES1533724	2	DC	685	0	0.685	-	-	260	-	-	-	10.3	-
TP483_0.4-0.6	TP483	15/10/2015	0.4-0.6	Normal	ES1533724	2	DC	-	-	-	-	-	250	-	-	-	16.4	-
TP484_0.0-0.05	TP484	23/10/2015	0-0.05	Normal	ES1534383	2	U	-	-	-	-	-	160	-	-	-	19	-
TP485_0.7-0.9	TP485	16/10/2015	0.7-0.9	Normal	ES1533824	2	D	-	-	-	-	-	200	-	-	-	17.8	-
TP486_0.1-0.3	TP486	15/10/2015	0.1-0.3	Normal	ES1533724	2	D	724	0	0.724	-	-	220	-	-	-	9.5	-
TP487_0.7-0.9	TP487	15/10/2015	0.7-0.9	Normal	ES1533724	2	D	-	-	-	-	-	210	-	-	-	13.4	-
TP488_0.3-0.4	TP488	15/10/2015	0.3-0.4	Normal	ES1533724	2	D	-	-	-	-	-	200	-	-	-	14.6	-
TP488_1.2-1.4	TP488	15/10/2015	1.2-1.4	Normal	ES1533724	2	D	29.9	0	0.0299	-	-	200	-	-	-	13.5	-
TPQ-024	TP488	15/10/2015	1.2-1.4	Field_D	ES1533724	2	D	-	-	-	-	-	-	-	-	-	14.1	-
TP489_0.1-0.3	TP489	15/10/2015	0.1-0.3	Normal	ES1533724	2	D	-	-	-	-	-	270	-	-	-	15.7	-
TPQ-021	TP489	15/10/2015	0.1-0.3	Field_D	ES1533724	2	D	-	-	-	-	-	-	-	-	-	16.1	-
TP489_0.4-0.6	TP489	15/10/2015	0.4-0.6	Normal	ES1533724	2	D	583	0	0.583	-	-	310	-	-	-	13.6	-
TP490_0.1-0.3	TP490	15/10/2015	0.1-0.3	Normal	ES1533724	2	D	612	0	0.612	-	-	260	-	-	-	16.4	-
TP491_0.1-0.3	TP491	15/10/2015	0.1-0.3	Normal	ES1533724	2	D	-	-	-	-	-	-	-	-	-	7.2	-
TP492_0.1-0.2	TP492	15/10/2015	0.1-0.2	Normal	ES1533724	2	D	-	-	-	-	-	-	-	-	-	9.9	-
TP492_1.0-1.2	TP492	15/10/2015	1-1.2	Normal	ES1533724	2	D	702	0	0.702	-	-	-	-	-	-	9.8	-
TPQ-019	TP492	15/10/2015	1-1.2	Field_D	ES1533724	2	D	-	-	-	-	-	-	-	-	-	17.8	-
TPQ-020	TP492	15/10/2015	1-1.2	Interlab_D	SE145052-1	2	D	-	-	-	-	-	310	-	-	-	14	-
TP493_0.1-0.3	TP493	16/10/2015	0.1-0.3	Normal	ES1533824	2	D	507	0	0.507	-	-	160	-	-	-	19.2	-
TP493_1.8-2.0	TP493	16/10/2015	1.8-2	Normal	ES1533824	2	D	602	0	0.602	-	-	170	-	-	-	12.4	-
MW404S_0.4-0.5	MW404S	21/10/2015	0.4-0.5	Normal	ES1534200	3	U	-	-	-	-	-	290	-	-	-	23.6	-
MWQ08	MW404S	21/10/2015	0.4-0.5	Field_D	ES1534200	3	U	-	-	-	-	-	240	-	-	-	23.8	-
MWQ09	MW404S	21/10/2015	0.4-0.5	Interlab_D	SE145246-1	3	U	-	-	-	-	-	330	-	-	-	25	-
MW404S_0.9-1.0	MW404S	21/10/2015	0.9-1	Normal	ES1534200	3	U	-	-	-	-	-	310	-	-	-	12.3	-
SED404_0.0-0.1	SED404	26/10/2015	0-0.1	Normal	ES1534541	3	U	-	-	-	-	-	-	-	-	-	48.1	-
TP313_0.1-0.3	TP313	13/10/2015	0.1-0.3	Normal	ES1533492	3	U	-	-	-	-	-	160	-	-	-	11.5	-
TP314_0-0.2	TP314	13/10/2015	0-0.2	Normal	ES1533492	3	DC	39.2	0	0.0392	-	-	230	-	-	-	14.8	-
TP314_0.6-0.8	TP314	13/10/2015	0.6-0.8	Normal	ES1533492	3	DC	-	-	-	-	-	230	-	-	-	13.6	-
TP315_0-0.2	TP315	13/10/2015	0-0.2	Normal	ES1533492	3	D	-	-	-	-	-	260	-	-	-	9.1	-
TPQ-009	TP315	13/10/2015	0-0.2	Field_D	ES1533492	3	D	-	-	-	-	-	240	-	-	-	10.4	-
TP315_1.6-1.8	TP315	13/10/2015	1.6-1.8	Normal	ES1533492	3	D	640	0	0.64	-	-	290	-	-	-	9.3	-
TP315_2.1-2.3	TP315	13/10/2015	2.1-2.3	Normal	ES1533492	3	D	-	-	-	-	-	280	-	-	-	9.2	-
TP317_0.1-0.3	TP317	14/10/2015	0.1-0.3	Normal	ES1533607	3	UC	-	-	-	-	-	200	-	-	-	24.1	-
TP318_0-0.2	TP318	14/10/2015	0-0.2	Normal	ES1533607	3	D	532	0	-	-	-	270	-	-	-	21.7	-
TP318_0.8-1.0	TP318	14/10/2015	0.8-1	Normal	ES1533607	3	DC	-	-	-	-	-	200	-	-	-	12.2	-
TPQ-015	TP318	14/10/2015	0.8-1	Field_D	ES1533607	3	DC	-	-	-	-	-	220	-	-	-	22.1	-
TP444_0.7-0.8	TP444	19/10/2015	0.7-0.8	Normal	ES1533951	3	D	-	-	-	-	-	180	<0.0005	<0.0005	-	17.2	-
TP445_0.2-0.4	TP445	19/10/2015	0.2-0.4	Normal	ES1533951	3	DC	-	-	-	-	-	280	-	-	-	16.2	-
TP445_0.9-1.1	TP445	19/10/2015	0.9-1.1	Normal	ES1533951	3	DC	-	-	-	-	-	270	<0.0005	<0.0005	-	21.4	-
TPQ_42	TP445	19/10/2015	0.9-1.1	Field_D	ES1533951	3	DC	-	-	-	-	-	280	-	-	-	21.2	-
TPQ-43	TP445	19/10/2015	0.9-1.1	Interlab_D	SE145126-1	3	DC	-	-	-	-	-	220	-	-	-	22	-
TP446_0.1-0.3	TP446	19/10/2015	0.1-0.3	Normal	ES1533951	3	DC	500	0	0.5	-	-	310	-	-	-	19.1	-
TP446_1.9-2.1	TP446	19/10/2015	1.9-2.1	Normal	ES1533951	3	DC	-	-	-	-	-	250	-	-	-	19.6	-
TP447_0.8-1.0	TP447	19/10/2015	0.8-1	Normal	ES1533951	3	DC	-	-	-	-	-	220	<0.0005	<0.0005	-	18.4	-
TPQ_38	TP447	19/10/2015	0.8-1	Field_D	ES1533951	3	DC	-	-	-	-	-	240	-	-	-	18.8	-
TP448_0-0.2	TP448	19/10/2015	0-0.2	Normal	ES1533951	3	DC	-	-	-	-	-	290	<0.0005	<0.0005	-	17.3	-
TP448_1.6-1.8	TP448	19/10/2015	1.6-1.8	Normal	ES1533951	3	U	-	-	-	-	-	250	-	-	-	25.6	-
TP449_0.4-0.6	TP449	19/10/2015	0.4-0.6	Normal	ES1533951	3	DC	-	-	-	-	-	-	<0.0005	<0.0005	-	22.3	-
TP449_1.0-1.2	TP449	19/10/2015	1-1.2	Normal	ES1533951	3	DC	-	-	-	-	-	400	-	-	-	22.1	-
TP450_0.1-0.3	TP450	19/10/2015	0.1-0.3	Normal	ES1533951	3	D	525	0	0.525	-	-	120	<0.0005	<0.0005	-	15.7	-
TP450_0.5-0.7	TP450	19/10/2015	0.5-0.7	Normal	ES1533951	3	D	-	-	-	-	-	260	-	-	-	21.4	-
TP450_2.3-2.5	TP450	19/10/2015	2.3-2.5	Normal	ES1533951	3	UC	-	-	-	-	-	200	-	-	-	16.9	-
TP452_0.0-0.05	TP452	21/10/2015	0-0.05	Normal	ES1534200	3	DC	-	-	-	-	-	320	-	-	-	6.4	-
TP453_0.0-0.1	TP453	21/10/2015	0-0.1	Normal	ES1534200	3	U	-	-	-	-	-	280	<0.0005	<0.0005	-	27.2	-
TP454_0.4-0.5	TP454	21/10/2015	0.4-0.5	Normal	ES1534200	3	D	-	-	-	-	-	110	-	-	-	10.9	-
TP455_0.0-0.1	TP455	22/10/2015	0-0.1	Normal	ES1534334	3	D	-	-	-	-	-	190	-	-	-	19.5	-
TP455_0.4-0.5	TP455	22/10/2015	0.4-0.5	Normal	ES1534334	3	D	56.7	0	0.0567	-	-	230	-	-	-	19.9	-
TP456_0.4-0.5	TP456	22/10/2015	0.4-0.5	Normal	ES1534334	3	D	-	-	-	-	-	190	-	-	-	26.2	-
TP457_0.0-0.1	TP457	22/10/2015	0-0.1	Normal	ES1534334	3	U	587	0	0.587	-	-	160	-	-	-	25.5	-
TPQ062	TP457	22/10/2015	0-0.1	Field_D	ES1534334	3	U	-	-	-	-	-	180	-	-	-	26.4	-
TPQ063	TP457	22/10/2015	0-0.1	Interlab_D	SE145454-1	3	U	-	-	-	-	-	170	-	-	-	25	-
TP458_0.9-1.0	TP458	22/10/2015	0.9-1	Normal	ES1534334	3	DC	-	-	-	-	-	200	-	-	-	22.3	-
TP459_0.0-0.1	TP459	21/10/2015	0-0.1	Normal	ES1534200	3	D	-	-	-	-	-	110	<0.0005	0.0016	-	10.7	-
TP459_0.5-0.6	TP459	21/10/2015	0.5-0.6	Normal	ES1534200	3	D	467	0	0.467	<0.0004	<0.001	120	-	-	-	17.3	-
TP460_0.0-0.2	TP460	21/10/2015	0-0.2	Normal	ES1534200	3	DC	-	-	-	-	-	270	-	-	-	20	-
TP460_0.9-1.0	TP460	21/10/2015	0.9-1	Normal	ES1534200	3	DC	-	-	-	-	-	240	-	-	-	22.3	-
TP461_0.0-0.2	TP461	21/10/2015	0-0.2	Normal	ES1534200	3	DC	470	0	0.47	<0.0004	<0.001	330	<0.0005	<0.0005	-	17.2	-
TPQ058	TP461	21/10/2015	0-0.2	Field_D	ES1534200	3	DC	-	-	-	-	-	370	-	-	-	17.4	-
TP461_0.6-0.8	TP461	21/10/2015	0.6-0.8	Normal	ES1534200	3	U	-	-	-	-	-	200	-	-	-	23.4	-
TP462_0.2-0.4	TP462	21/10/2015	0.2-0.4	Normal	ES1534200	3	D	-	-	-	-	-	320	-	-	-	18.2	-
TP463_0.1-0.2	TP463	19/10/2015	0.1-0.2	Normal	ES1533951	3	DC	-	-	-	-	-	310	-	-	-	17.1	-
TP464_0.0-0.2	TP464	21/10/2015	0-0.2	Normal	ES1534200	3	D	446	0	0.446	<0.0004	<0.001	230	-	-	-	9	-
TP464_0.4-0.5	TP464	21/10/2015	0.4-0.5	Normal	ES1534200	3	UC	-	-	-	-	-	200	-	-	-	16.3	-
TPQ057	TP464	21/10/2015	0.4-0.5	Field_D	ES1534200	3	UC	-	-	-	-	-	200	-	-	-	14.3	-
TP465_0.0-0.1	TP465	21/10/2015	0-0.1	Normal	ES1534200	3	D	484	0	0.484	<0.0004	<0.001	120	-	-	-	9.9	-
TP466_0.0-0.1	TP466	21/10/2015	0-0.1	Normal	ES1534200	3	D	-	-	-	-	-	270	-	-	9.3	11.7	5.7
TP466_0.4-0.5	TP466	21/10/2015	0.4-0.5	Normal	ES1534200	3	UC	-	-	-	-	-	270	-	-	-	17.3	-
TP467_0-0.1	TP467	21/10/2015	0-0.1	Normal	ES1534200	3	D	-	-	-	-	-	350	-	-	-	32.3	-
TP468_0.0-0.1	TP468	22/10/2015	0-0.1	Normal	ES1534334	3	D	-	-	-	-	-	450	-	-	-	25.1	-
TP468_0.4-0.5	TP468	22/10/2015	0.4-0.5	Normal	ES1534334	3	DC	-	-	-	-	-	270	-	-	-	25.3	-
TP469_0.0-0.1	TP469	22/10/2015	0-0.1	Normal	ES1534334	3	D	452	0	0.452	-	-	60	-	-	-	19	-
TP470_0.0-0.1	TP470	22/10/2015	0-0.1	Normal	ES1534334	3	DC	388	0	0.388	-	-	60	-	-	-	21.6	-
TP470_0.5-0.6	TP470	22/10/2015	0.5-0.6	Normal	ES1534334	3	DC	-	-	-	-	-	190	-	-	-	22.7	-
TP471_0.0-0.1	TP471	20/10/2015	0-0.1	Normal	ES1534200	3	D	-	-	-	-	-	130	-	-	-	7.8	-
TP471_0.9-1.0	TP471	20/10/2015	0.9-1	Normal	ES1534200	3	DC	-	-	-	-	-	230	-	-	-	16.8	-
TP472_0.0-0.1	TP472	20/10/2015	0-0.1	Normal	ES1534200	3	UC	-	-	-	-	-	160	-	-	-	13.2	-
TP473_0.0-0.1	TP473	22/10/2015	0-0.1	Normal	ES1534334	3	D	394	0	0.394	-	-	210	-	-	-	12.8	-
TP473_0.4-0.5	TP473	22/10/2015	0.4-0.5	Normal	ES1534334	3	D	-	-	-	-	-	170	-	-	-	10.7	-
TP474_0.1-0.3	TP474	16/10/2015	0.1-0.3	Normal	ES1533824	3	D	400	0	0.4	-	-	330	-	-	17.2	19.8	7.4
TP476_0.5-0.6	TP476	22/10/2015	0.5-0.6	Normal	ES1534334	3	DC	-	-	-	-	-	250	-	-	-	13.2	-
TP477_0.2-0.4	TP477	16/10/2015	0.2-0.4	Normal	ES1533824	3	UC	-	-	-	-	-	130	<0.0005	<0.0005	-	8	-
HA409_0.0-0.1	HA409	19/10/2015	0-0.1	Normal	ES1534055	4	U	-	-	-	-	-	110	-	-	3.8	8.2	5.5

Field_ID	Metals: Arsenic	Barium	Cadmium	Chromium (III+VI)	Copper	Lead	Manganese	Mercury	Nickel	Zinc	TRH - NEPM 2013: C6-C10 minus BTEX (F1)	C6 - C10 Fraction	>C10-C16 minus Naphthalene (F2)	>C10 - C16 Fraction	>C16 - C34 Fraction (F3)	>C34 - C40 Fraction (F4)	>C10 - C40 (Sum of Total)
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR	5	10	1	2	5	5	5	0.1	2	5	10	10	50	50	100	100	50
Toxicity derivation, and Region IX exposure factors (USEPA 2009b)[1]																	
US EPA Residential Soil Screening Level[2]		15,000															
NEPM 2013 Site Specific EIL-Urban Residential (Disturbed)[3]	100			190	60	1100			30	70							
NEPM 2013 Site Specific EIL-Urban Residential (Undisturbed)3	100			250	95	1100			170	180							
NEPM 2013 Table 1A(1) HILs Res A Soil[4]	100		20	100	6000	300	3800	40	400	7400							
NEPM 2013 Table 1A(1) HILs Res B Soil[4]	500		150	500	30000	1200	14000	120	1200	60000							
NEPM 2013 Table 1A(1) HILs Rec C Soil[4]	300		90	300	17000	600	19000	80	1200	30000							
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand[5]																	
0-1m											45		110				
1-2m											70		240				
2-4m											110		440				
>4m											200		NL				
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand[5]																	
0-1m											NL		NL				
1-2m											NL		NL				
2-4m											NL		NL				
>4m											NL		NL				
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil[6]																	
0-2m											**180**		**120**		**300**	**2800**	
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil[7]												700		1000	2500	10000	
CRCCare Soil Direct Contact HSL-A Residential (Low Density)[8]												4400		3300	4500	6300	
CRCCare Soil Direct Contact HSL-B Residential (High Density)[8]												5600		4200	5800	8100	
CRCCare Soil Direct Contact HSL-C Recreational / Open Space[8]												5100		3800	5300	7400	
CRCCare Soil Direct Contact Intrusive Works[9]												82000		62000	85000	120000	
CRCCare Soil HSL Vap Int Intrusive Works 0 to <2m Sand[10]												NL		NL			
CRCCare Soil HSL Vap Int Intrusive Works 2 to <4m Sand[10]												NL		NL			
TP478_0.1-0.3	15	10	<1	<2	12	27	<5	0.2	4	28	<10	<10	160	160	740	110	1010
TP479_0.1-0.2	17	10	<1	<2	20	39	<5	0.2	32	216	<10	<10	<50	<50	180	<100	180
TP479_0.2-0.4	<5	<10	<1	<2	<5	<5	<5	<0.1	22	74	<10	<10	<50	<50	<100	<100	<50
TPQ-016	6	<10	<1	<2	<5	<5	<5	<0.1	28	72	<10	<10	<50	<50	<100	<100	<50
TP480_0.4-0.6	5	70	<1	3	35	20	64	<0.1	15	88	<10	<10	<50	<50	<100	<100	<50
TP481_0.4-0.5	21	40	<1	2	52	20	11	0.1	25	176	<10	<10	<50	<50	160	<100	160
TP483_0.1-0.3	<5	60	<1	3	17	15	332	<0.1	8	62	<10	<10	<50	<50	<100	<100	<50
TP483_0.4-0.6	<5	100	<1	3	15	13	1210	<0.1	16	116	<10	<10	<50	<50	<100	<100	<50
TP484_0.0-0.05	<5	30	<1	<2	<5	11	147	<0.1	4	34	<10	<10	<50	<50	<100	<100	<50
TP485_0.7-0.9	<5	40	<1	<2	10	13	130	<0.1	5	41	<10	<10	<50	<50	<100	<100	<50
TP486_0.1-0.3	<5	50	<1	2	12	13	162	<0.1	7	53	<10	<10	<50	<50	<100	<100	<50
TP487_0.7-0.9	<5	40	<1	<2	9	12	165	<0.1	6	48	<10	<10	<50	<50	<100	<100	<50
TP488_0.3-0.4	<5	80	<1	2	10	12	109	<0.1	5	43	<10	<10	<50	<50	<100	<100	<50
TP488_1.2-1.4	<5	60	<1	3	11	13	94	<0.1	7	49	<10	<10	<50	<50	<100	<100	<50
TPQ-024	<5	40	<1	2	11	13	62	<0.1	6	48	<10	<10	<50	<50	<100	<100	<50
TP489_0.1-0.3	<5	140	<1	5	29	24	31	<0.1	15	99	<10	<10	<50	<50	<100	<100	<50
TPQ-021	<5	100	<1	5	23	20	33	<0.1	12	87	<10	<10	<50	<50	<100	<100	<50
TP489_0.4-0.6	5	50	<1	3	25	19	129	<0.1	10	80	<10	<10	<50	<50	<100	<100	<50
TP490_0.1-0.3	6	250	<1	3	12	18	22	<0.1	5	105	<10	<10	<50	<50	<100	<100	<50
TP491_0.1-0.3	<5	130	<1	2	<5	10	498	<0.1	27	200	<10	<10	<50	<50	<100	<100	<50
TP492_0.1-0.2	5	160	<1	4	10	14	415	<0.1	18	191	<10	<10	<50	<50	<100	<100	<50
TP492_1.0-1.2	8	150	<1	5	13	18	430	<0.1	13	137	<10	<10	<50	<50	<100	<100	<50
TPQ-019	5	290	<1	8	10	14	244	<0.1	14	129	<10	<10	<50	<50	<100	<100	<50
TPQ-020	7	68	<0.3	2.7	8.2	11	490	0.02	8.6	94	<25	<25	<25	<25	<90	<120	<210
TP493_0.1-0.3	6	140	<1	<2	5	12	23	<0.1	3	42	<10	<10	<50	<50	<100	<100	<50
TP493_1.8-2.0	11	120	<1	3	17	17	109	<0.1	4	48	<10	<10	<50	<50	160	<100	160
MW404S_0.4-0.5	6	110	<1	4	8	12	138	<0.1	9	79	<10	<10	<50	<50	<100	<100	<50
MWQ08	13	130	<1	4	8	13	130	<0.1	10	104	<10	<10	<50	<50	<100	<100	<50
MWQ09	5	98	<0.3	5	9.6	14	150	0.01	9.3	82	<25	<25	<25	<25	<90	<120	<210
MW404S_0.9-1.0	<5	10	<1	<2	21	21	163	<0.1	4	119	<10	<10	<50	<50	<100	<100	<50
SED404_0.0-0.1	<5	-	<1	4	11	16	-	<0.1	8	66	<10	<10	<50	<50	<100	<100	<50
TP313_0.1-0.3	<5	60	<1	8	10	30	19	0.3	4	47	<10	<10	<50	<50	<100	<100	<50
TP314_0-0.2	16	80	<1	<2	55	15	12	<0.1	2	33	<10	<10	<50	<50	180	<100	180
TP314_0.6-0.8	12	60	<1	2	38	15	37	<0.1	5	48	<10	<10	<50	<50	<100	<100	<50
TP315_0-0.2	7	70	<1	4	15	14	504	<0.1	30	187	<10	<10	<50	<50	<100	<100	<50
TPQ-009	7	70	<1	3	16	15	500	<0.1	25	162	<10	<10	<50	<50	<100	<100	<50
TP315_1.6-1.8	6	100	<1	3	17	15	220	<0.1	17	108	<10	<10	<50	<50	<100	<100	<50
TP315_2.1-2.3	7	80	<1	3	18	18	209	<0.1	13	108	<10	<10	<50	<50	<100	<100	<50
TP317_0.1-0.3	7	70	<1	3	28	14	90	<0.1	18	124	<10	<10	<50	<50	100	<100	100
TP318_0-0.2	7	50	<1	3	16	18	493	<0.1	22	156	<10	<10	<50	<50	100	<100	100
TP318_0.8-1.0	<5	50	<1	2	10	15	302	<0.1	16	139	<10	<10	<50	<50	<100	<100	<50
TPQ-015	6	50	<1	3	14	16	325	<0.1	17	130	<10	<10	<50	<50	<100	<100	<50
TP444_0.7-0.8	6	50	<1	<2	16	15	16	<0.1	7	61	<10	<10	<50	<50	<100	<100	<50
TP445_0.2-0.4	9	60	<1	<2	44	18	20	<0.1	6	95	<10	<10	100	100	460	<100	550
TP445_0.9-1.1	14	80	<1	<2	38	25	22	<0.1	6	87	<10	<10	90	90	400	<100	490
TPQ_42	8	60	<1	<2	33	18	21	<0.1	5	64	<10	<10	80	80	300	<100	380
TPQ-43	19	57	<0.3	1.2	38	16	61	0.09	6.8	81	<25	<25	65	65	170	<120	220
TP446_0.1-0.3	10	70	<1	<2	57	19	17	<0.1	9	108	<10	<10	90	90	460	<100	550
TP446_1.9-2.1	8	90	<1	<2	26	17	20	<0.1	10	128	<10	<10	<50	<50	210	<100	210
TP447_0.8-1.0	<5	20	<1	<2	22	16	<5	<0.1	11	148	26	26	100	100	380	<100	480
TPQ_38	<5	30	<1	<2	27	14	<5	<0.1	14	149	12	12	80	80	340	<100	420
TP448_0-0.2	14	70	<1	<2	44	22	6	<0.1	11	108	<10	<10	90	90	460	<100	550
TP448_1.6-1.8	7	80	<1	4	56	22	73	<0.1	37	187	<10	<10	<50	<50	<100	<100	<50
TP449_0.4-0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP449_1.0-1.2	19	240	<1	<2	34	30	10	<0.1	7	136	<10	<10	60	60	380	<100	440
TP450_0.1-0.3	9	80	<1	<2	51	20	71	<0.1	7	92	18	18	140	140	600	<100	740
TP450_0.5-0.7	10	60	<1	<2	46	20	23	<0.1	19	124	<10	<10	110	110	530	<100	640
TP450_2.3-2.5	<5	30	<1	<2	63	14	8	<0.1	4	77	36	54	250	250	740	<100	990
TP452_0.0-0.05	12	90	<1	<2	62	16	30	<0.1	8	92	<10	<10	170	170	740	100	1010
TP453_0.0-0.1	<5	30	<1	3	17	17	372	<0.1	33	453	<10	<10	<50	<50	<100	<100	<50
TP454_0.4-0.5	<5	30	<1	8	<5	7	9	<0.1	<2	<5	<10	<10	<50	<50	<100	<100	<50
TP455_0.0-0.1	7	90	<1	3	9	15	165	<0.1	7	81	<10	<10	<50	<50	<100	<100	<50
TP455_0.4-0.5	11	40	<1	<2	9	25	79	<0.1	6	86	<10	<10	<50	<50	<100	<100	<50
TP456_0.4-0.5	<5	70	<1	<2	<5	7	21	<0.1	3	40	<10	<10	<50	<50	<100	<100	<50
TP457_0.0-0.1	5	20	<1	<2	8	10	194	<0.1	8	69	<10	<10	<50	<50	<100	<100	<50
TPQ062	6	20	<1	<2	6	8	108	<0.1	7	72	<10	<10	<50	<50	<100	<100	<50
TPQ063	5	11	<0.3	1.1	5.3	7	70	<0.01	4.8	56	<25	<25	<25	<25	<90	<120	<210
TP458_0.9-1.0	11	40	<1	2	20	14	165	<0.1	16	133	<10	<10	<50	<50	<100	<100	<50
TP459_0.0-0.1	<5	50	<1	5	<5	12	33	<0.1	2	13	<10	<10	<50	<50	<100	<100	<50
TP459_0.5-0.6	<5	80	<1	6	<5	20	52	<0.1	4	25	<10	<10	<50	<50	<100	<100	<50
TP460_0.0-0.2	5	60	<1	2	26	17	53	<0.1	10	74	<10	<10	<50	<50	110	<100	110
TP460_0.9-1.0	6	70	<1	3	40	17	119	<0.1	16	124	<10	<10	<50	<50	<100	<100	<50
TP461_0.0-0.2	9	50	<1	4	41	18	595	<0.1	26	148	<10	<10	<50	<50	<100	<100	<50
TPQ058	9	50	<1	4	34	17	776	<0.1	29	163	<10	<10	<50	<50	<100	<100	<50
TP461_0.6-0.8	6	100	<1	4	14	15	560	<0.1	15	106	<10	<10	<50	<50	<100	<100	<50
TP462_0.2-0.4	<5	50	<1	4	44	17	238	<0.1	68	324	<10	<10	<50	<50	<100	<100	<50
TP463_0.1-0.2	11	40	<1	4	29	15	277	<0.1	16	160	<10	<10	<50	<50	<100	<100	<50
TP464_0.0-0.2	6	80	<1	6	15	18	99	<0.1	8	60	<10	<10	<50	<50	<100	<100	<50
TP464_0.4-0.5	7	40	<1	2	12	15	206	<0.1	12	80	<10	<10	<50	<50	<100	<100	<50
TPQ057	9	60	<1	5	18	20	154	<0.1	13	86	<10	<10	<50	<50	<100	<100	<50
TP465_0.0-0.1	<5	90	<1	5	<5	11	22	<0.1	2	16	<10	<10	<50	<50	<100	<100	<50
TP466_0.0-0.1	<5	130	<1	5	9	13	121	<0.1	6	42	<10	<10	<50	<50	<100	<100	<50
TP466_0.4-0.5	5	20	<1	4	40	16	271	<0.1	13	107	<10	<10	<50	<50	<100	<100	<50
TP467_0-0.1	7	180	<1	6	19	19	877	<0.1	16	114	<10	<10	<50	<50	<100	<100	<50
TP468_0.0-0.1	8	270	<1	5	17	19	1170	<0.1	11	139	<10	<10	<50	<50	<100	<100	<50
TP468_0.4-0.5	12	50	<1	3	31	16	112	<0.1	16	102	<10	<10	<50	<50	<100	<100	<50
TP469_0.0-0.1	<5	30	<1	4	<5	11	25	<0.1	<2	<5	<10	<10	<50	<50	<100	<100	<50
TP470_0.0-0.1	<5	40	<1	4	<5	5	36	<0.1	3	11	<10	<10	<50	<50	<100	<100	<50
TP470_0.5-0.6	9	120	<1	3	23	19	168	<0.1	14	102	<10	<10	<50	<50	<100	<100	<50
TP471_0.0-0.1	6	60	<1	6	<5	28	67	<0.1	2	18	<10	<10	<50	<50	<100	<100	<50
TP471_0.9-1.0	<5	180	<1	4	<5	8	27	<0.1	<2	29	<10	<10	<50	<50	<100	<100	<50
TP472_0.0-0.1	<5	90	<1	3	11	10	180	<0.1	8	69	<10	<10	<50	<50	<100	<100	<50
TP473_0.0-0.1	7	80	<1	4	12	19	79	<0.1	6	59	<10	<10	<50	<50	<100	<100	<50
TP473_0.4-0.5	<5	90	<1	5	7	11	36	<0.1	4	29	<10	<10	<50	<50	<100	<100	<50
TP474_0.1-0.3	<5	180	<1	8	10	11	<5	<0.1	<2	7	<10	<10	<50	<50	<100	<100	<50
TP476_0.5-0.6	<5	20	<1	<2	10	16	16	<0.1	5	56	<10	<10	<50	<50	120	<100	120
TP477_0.2-0.4	<5	<10	<1	<2	<5	<5	<5	<0.1	<2	24	<10	<10	90	90	310	<100	400
HA409_0.0-0.1	10	40	<1	13	<5	25	35	<0.1	<2	17	<10	<10	<50	<50	130	<100	130

Field_ID	BTEX: Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc	PAH: Pyrene	Acenaphthene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo[b+j]fluoranthene	Benzo(k)fluoranthene
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR	0.2	0.5	0.5	0.5	0.5	0.5	0.2	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Toxicity derivation, and Region IX exposure factors (USEPA 2009b)[1]														
US EPA Residential Soil Screening Level[2]														
NEPM 2013 Site Specific EIL-Urban Residential (Disturbed)[3]														
NEPM 2013 Site Specific EIL-Urban Residential (Undisturbed)3														
NEPM 2013 Table 1A(1) HILs Res A Soil[4]														
NEPM 2013 Table 1A(1) HILs Res B Soil[4]														
NEPM 2013 Table 1A(1) HILs Rec C Soil[4]														
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand[5]														
0-1m	0.5	160	55			40								
1-2m	0.5	220	NL			60								
2-4m	0.5	310	NL			95								
>4m	0.5	540	NL			170								
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand[5]														
0-1m	NL	NL	NL			NL								
1-2m	NL	NL	NL			NL								
2-4m	NL	NL	NL			NL								
>4m	NL	NL	NL			NL								
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil[6]														
0-2m	**50**	**85**	**70**			**105**						**0.7**		
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil[7]														
CRCCare Soil Direct Contact HSL-A Residential (Low Density)[8]	100	14000	4500			12000								
CRCCare Soil Direct Contact HSL-B Residential (High Density)[8]	140	21000	5900			17000								
CRCCare Soil Direct Contact HSL-C Recreational / Open Space[8]	120	18000	5300			15000								
CRCCare Soil Direct Contact Intrusive Works[9]	1100	120000	85000			130000								
CRCCare Soil HSL Vap Int Intrusive Works 0 to <2m Sand[10]	77	NL	NL			NL								
CRCCare Soil HSL Vap Int Intrusive Works 2 to <4m Sand[10]	160	NL	NL			NL								
TP478_0.1-0.3	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP479_0.1-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP479_0.2-0.4	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TPQ-016	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP480_0.4-0.6	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP481_0.4-0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP483_0.1-0.3	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP483_0.4-0.6	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP484_0.0-0.05	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP485_0.7-0.9	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP486_0.1-0.3	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP487_0.7-0.9	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP488_0.3-0.4	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP488_1.2-1.4	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TPQ-024	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP489_0.1-0.3	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TPQ-021	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP489_0.4-0.6	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP490_0.1-0.3	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP491_0.1-0.3	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP492_0.1-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP492_1.0-1.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TPQ-019	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TPQ-020	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	0.3	<0.1	<0.1	0.1	0.1	0.1	<0.1
TP493_0.1-0.3	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP493_1.8-2.0	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
MW404S_0.4-0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
MWQ08	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
MWQ09	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
MW404S_0.9-1.0	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
SED404_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP313_0.1-0.3	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP314_0-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP314_0.6-0.8	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP315_0-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TPQ-009	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP315_1.6-1.8	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP315_2.1-2.3	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP317_0.1-0.3	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP318_0-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP318_0.8-1.0	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TPQ-015	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP444_0.7-0.8	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP445_0.2-0.4	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP445_0.9-1.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TPQ_42	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TPQ-43	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	0.2	<0.1	<0.1	0.1	<0.1	<0.1	<0.1
TP446_0.1-0.3	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5
TP446_1.9-2.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP447_0.8-1.0	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TPQ_38	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP448_0-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP448_1.6-1.8	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP449_0.4-0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP449_1.0-1.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP450_0.1-0.3	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP450_0.5-0.7	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP450_2.3-2.5	2.2	4.6	2.1	2.4	7.4	9.8	18.7	0.8	<0.5	<0.5	0.5	<0.5	<0.5	<0.5
TP452_0.0-0.05	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP453_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP454_0.4-0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP455_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP455_0.4-0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP456_0.4-0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP457_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TPQ062	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TPQ063	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TP458_0.9-1.0	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP459_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP459_0.5-0.6	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP460_0.0-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP460_0.9-1.0	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP461_0.0-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TPQ058	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP461_0.6-0.8	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP462_0.2-0.4	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP463_0.1-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP464_0.0-0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP464_0.4-0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TPQ057	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP465_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP466_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP466_0.4-0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP467_0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP468_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP468_0.4-0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP469_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP470_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP470_0.5-0.6	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP471_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP471_0.9-1.0	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP472_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP473_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP473_0.4-0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP474_0.1-0.3	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP476_0.5-0.6	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
TP477_0.2-0.4	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
HA409_0.0-0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

Field_ID	PAH: Benzo(g,h,i)perylene	Chrysene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	PAHs (Sum of detections)	Benzo(a)pyrene TEQ (zero) - Lab Calc	Benzo(a)pyrene TEQ (half LOR) - Lab Calc	Benzo(a)pyrene TEQ (LOR) - Lab Calc	Benzo(a)pyrene TEQ (lower bound) *	Benzo(a)pyrene TEQ (upper bound) *	OC Pesticides: Aldrin + Dieldrin	chlordane	4,4 DDT	DDT+DDE+DDD - Lab Calc	Endosulfan	Endrin	Heptachlor	Hexachlorobenzene	Methoxychlor	PCBs: PCBs (Total)
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR	0.5	0.5	0.5	0.5	0.5	0.5	0.5	-	0.5	0.5	0.5	0.5	0.5	0.05	0.05	0.2	0.05	0.05	0.05	0.05	0.05	0.2	0.1
Toxicity derivation, and Region IX exposure factors (USEPA 2009b)[1]																							
US EPA Residential Soil Screening Level[2]																							
NEPM 2013 Site Specific EIL-Urban Residential (Disturbed)[3]						170										180	180						
NEPM 2013 Site Specific EIL-Urban Residential (Undisturbed)3						170										180	180						
NEPM 2013 Table 1A(1) HILs Res A Soil[4]								300	3	3	3			6	50		240	270	10	6	10	300	1
NEPM 2013 Table 1A(1) HILs Res B Soil[4]								400	4	4	4			10	90		600	400	20	10	15	500	1
NEPM 2013 Table 1A(1) HILs Rec C Soil[4]								300	3	3	3			10	70		400	340	20	10	10	400	1
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand[5]																							
0-1m						3																	
1-2m						NL																	
2-4m						NL																	
>4m						NL																	
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand[5]																							
0-1m						NL																	
1-2m						NL																	
2-4m						NL																	
>4m						NL																	
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil[6]																							
0-2m																							
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil[7]																							
CRCCare Soil Direct Contact HSL-A Residential (Low Density)[8]						1400																	
CRCCare Soil Direct Contact HSL-B Residential (High Density)[8]						2200																	
CRCCare Soil Direct Contact HSL-C Recreational / Open Space[8]						1900																	
CRCCare Soil Direct Contact Intrusive Works[9]						29000																	
CRCCare Soil HSL Vap Int Intrusive Works 0 to <2m Sand[10]						NL																	
CRCCare Soil HSL Vap Int Intrusive Works 2 to <4m Sand[10]						NL																	
TP478_0.1-0.3	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	1.5	2.8	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP479_0.1-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP479_0.2-0.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TPQ-016	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP480_0.4-0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1
TP481_0.4-0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP483_0.1-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1
TP483_0.4-0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP484_0.0-0.05	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP485_0.7-0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP486_0.1-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP487_0.7-0.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP488_0.3-0.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP488_1.2-1.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TPQ-024	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP489_0.1-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TPQ-021	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP489_0.4-0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	0.6	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP490_0.1-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP491_0.1-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP492_0.1-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1
TP492_1.0-1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TPQ-019	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TPQ-020	<0.1	0.1	0.3	<0.1	<0.1	<0.1	0.2	1.4	-	<0.2	-	-	<0.3	-	-	-	-	-	-	-	-	-	-
TP493_0.1-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP493_1.8-2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
MW404S_0.4-0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1
MWQ08	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-
MWQ09	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.8	-	<0.2	-	-	<0.3	-	-	-	-	-	-	-	-	-	-
MW404S_0.9-1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	0.6	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-
SED404_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-
TP313_0.1-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP314_0-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP314_0.6-0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP315_0-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1
TPQ-009	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP315_1.6-1.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP315_2.1-2.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP317_0.1-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP318_0-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1	1	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP318_0.8-1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	0.6	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TPQ-015	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	0.8	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP444_0.7-0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP445_0.2-0.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	0.6	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP445_0.9-1.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TPQ_42	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TPQ-43	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	1	-	<0.2	-	-	<0.3	-	-	-	-	-	-	-	-	-	-
TP446_0.1-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP446_1.9-2.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP447_0.8-1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	1.3	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TPQ_38	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	0.7	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP448_0-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	0.8	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP448_1.6-1.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP449_0.4-0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP449_1.0-1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP450_0.1-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	1.4	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP450_0.5-0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	1.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP450_2.3-2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1 - 0.8	0.8	2.9	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP452_0.0-0.05	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	1.5	2.8	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-
TP453_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-
TP454_0.4-0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-
TP455_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP455_0.4-0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP456_0.4-0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP457_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TPQ062	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TPQ063	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.8	-	<0.2	-	-	<0.3	-	-	-	-	-	-	-	-	-	-
TP458_0.9-1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP459_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-
TP459_0.5-0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-
TP460_0.0-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-
TP460_0.9-1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-
TP461_0.0-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-
TPQ058	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-
TP461_0.6-0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-
TP462_0.2-0.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	0.6	<0.5	0.6	1.2	-	-	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1
TP463_0.1-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP464_0.0-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-
TP464_0.4-0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-
TPQ057	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-
TP465_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-
TP466_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1
TP466_0.4-0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-
TP467_0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1
TP468_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP468_0.4-0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP469_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP470_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP470_0.5-0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP471_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-
TP471_0.9-1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-
TP472_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-	-	-	-	-	-	-	-	-	-	-
TP473_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP473_0.4-0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP474_0.1-0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1
TP476_0.5-0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
TP477_0.2-0.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.6	2.2	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-
HA409_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2	-	-	-	-	-	-	-	-	-	-

Appendix C
Table 2
Analytical Results - Soil and Sediment

Field_ID	Location_Code	Sampled_Date_Time	Sample_Depth_Range	Sample_Type	Lab_Report_Number	Area	Material Type[11]	weight of sample	Asbestos: Asbestos (Presence/Absence)	Asbestos: Weight Used for % Calculation	Asbestos: Asbestos Containing Material	Asbestos: Friable Asbestos (as Asbestos in Soil)	Anion: Fluoride	PFC: PFOA	PFC: PFOS	Inorganics: CEC	Inorganics: Moisture	Inorganics: pH (Lab)
								g	-	kg	g	%	mg/kg	mg/kg	mg/kg	meq/100g	%	pH Units
LOR								0.01		0.0001	0.0004	0.001	40	0.0005	0.0005	0.1	1	0.1
Toxicity derivation, and Region IX exposure factors (USEPA 2009b)[1]														16	6			
US EPA Residential Soil Screening Level[2]													3100					
HA410_0.0-0.1	HA410	19/10/2015	0-0.1	Normal	ES1534055	4	U	-	-	-	-	-	90	-	-	-	7.5	-
HA411_0.0-0.1	HA411	19/10/2015	0-0.1	Normal	ES1534055	4	U	-	-	-	-	-	140	-	-	-	9.9	-
HA412_0.0-0.1	HA412	19/10/2015	0-0.1	Normal	ES1534055	4	U	-	-	-	-	-	100	-	-	-	7.1	-
HA413_0.0-0.1	HA413	20/10/2015	0-0.1	Normal	ES1534055	4	D	-	-	-	-	-	180	-	-	-	11.5	-
HA414_0.0-0.1	HA414	27/10/2015	0-0.1	Normal	ES1534594	4	U	224	0	0.224	-	-	150	-	-	-	12.8	-
HA414_0.4-0.5	HA414	27/10/2015	0.4-0.5	Normal	ES1534594	4	U	-	-	-	-	-	190	-	-	-	17	-
MW401_0.4-0.5	MW401	13/10/2015	0.4-0.5	Normal	ES1533492	4	D	27.6	0	0.0276	-	-	240	-	-	-	7.4	-
MWQ04	MW401	13/10/2015	0.4-0.5	Field_D	ES1533492	4	D	-	-	-	-	-	220	-	-	-	7.8	-
MW401_0.9-1.0	MW401	13/10/2015	0.9-1	Normal	ES1533492	4	DC	-	-	-	-	-	230	-	-	-	8.1	-
MW402_0.0-0.1	MW402	13/10/2015	0-0.1	Normal	ES1533492	4	DC	-	-	-	-	-	200	-	-	-	9.6	-
MW402_0.4-0.5	MW402	13/10/2015	0.4-0.5	Normal	ES1533824	4	DC	293	0	0.293	-	-	230	-	-	-	13.4	-
TP320_0.1-0.2	TP320	14/10/2015	0.1-0.2	Normal	ES1533607	4	DC	581	0	-	-	-	130	-	-	-	17.8	-
TP432_0-0.1	TP432	20/10/2015	0-0.1	Normal	ES1534055	4	DC	-	-	-	-	-	170	-	-	-	13.8	-
TP432_0.4-0.5	TP432	20/10/2015	0.4-0.5	Normal	ES1534055	4	DC	-	-	-	-	-	110	-	-	4	10.7	5.7
TPQ-051	TP432	20/10/2015	0.4-0.5	Field_D	ES1534055	4	DC	-	-	-	-	-	130	-	-	-	10.1	-
TP434_0-0.1	TP434	20/10/2015	0-0.1	Normal	ES1534055	4	DC	-	-	-	-	-	330	-	-	-	15.9	-
TP434_0.4-0.5	TP434	20/10/2015	0.4-0.5	Normal	ES1534055	4	DC	-	-	-	-	-	260	-	-	-	22.7	-
TP435_0.0-0.1	TP435	20/10/2015	0-0.1	Normal	ES1534200	4	U	-	-	-	-	-	150	-	-	-	9	-
TP436_0.0-0.1	TP436	21/10/2015	0-0.1	Normal	ES1534200	4	D	-	-	-	-	-	180	-	-	-	12.2	-
TP436_0.9-1.0	TP436	21/10/2015	0.9-1	Normal	ES1534200	4	DC	-	-	-	-	-	180	-	-	-	19	-
TP437_0.0-0.1	TP437	22/10/2015	0-0.1	Normal	ES1534334	4	D	24.6	0	0.0246	-	-	100	-	-	-	8.9	-
TP438_0-0.1	TP438	20/10/2015	0-0.1	Normal	ES1534055	4	U	-	-	-	-	-	110	-	-	-	6.2	-
TP439_0.0-0.1	TP439	22/10/2015	0-0.1	Normal	ES1534334	4	DC	517	0	0.517	-	-	220	-	-	-	15.2	-
TP439_2.7-2.8	TP439	22/10/2015	2.7-2.8	Normal	ES1534334	4	DC	524	0	0.524	-	-	210	-	-	-	11.8	-
TP440_0.4-0.5	TP440	20/10/2015	0.4-0.5	Normal	ES1534055	4	U	-	-	-	-	-	460	-	-	-	19.2	-
TP441_0.0-0.1	TP441	22/10/2015	0-0.1	Normal	ES1534334	4	DC	623	0	0.623	-	-	200	-	-	-	11.7	-
TP441_2.7-2.8	TP441	22/10/2015	2.7-2.8	Normal	ES1534334	4	DC	412	0	0.412	-	-	170	-	-	-	13	-
TPQ064	TP441	22/10/2015	2.7-2.8	Field_D	ES1534334	4	DC	-	-	-	-	-	190	-	-	-	12.6	-
TP442_0.2-0.4	TP442	19/10/2015	0.2-0.4	Normal	ES1533951	4	DC	-	-	-	-	-	160	-	-	-	10.9	-
TP443_0.0-0.1	TP443	21/10/2015	0-0.1	Normal	ES1534200	4	D	-	-	-	-	-	200	-	-	-	12.5	-
TP443_0.3-0.4	TP443	21/10/2015	0.3-0.4	Normal	ES1534200	4	D	-	-	-	-	-	370	-	-	-	9.3	-

Field_ID	Metals: Arsenic	Barium	Cadmium	Chromium (III+VI)	Copper	Lead	Manganese	Mercury	Nickel	Zinc
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR	5	10	1	2	5	5	5	0.1	2	5
US EPA Residential Soil Screening Level[2]		15,000								
NEPM 2013 Site Specific EIL-Urban Residential (Disturbed)[3]	100			190	60	1100			30	70
NEPM 2013 Site Specific EIL-Urban Residential (Undisturbed)3	100			250	95	1100			170	180
NEPM 2013 Table 1A(1) HILs Res A Soil[4]	100		20	100	6000	300	3800	40	400	7400
NEPM 2013 Table 1A(1) HILs Res B Soil[4]	500		150	500	30000	1200	14000	120	1200	60000
NEPM 2013 Table 1A(1) HILs Rec C Soil[4]	300		90	300	17000	600	19000	80	1200	30000
HA410_0.0-0.1	5	50	<1	8	<5	24	62	<0.1	2	24
HA411_0.0-0.1	<5	60	<1	4	6	22	52	<0.1	5	31
HA412_0.0-0.1	<5	40	<1	4	<5	18	76	<0.1	<2	15
HA413_0.0-0.1	6	80	<1	6	<5	12	28	<0.1	<2	14
HA414_0.0-0.1	<5	60	<1	5	<5	13	51	<0.1	2	25
HA414_0.4-0.5	<5	30	<1	10	<5	11	7	<0.1	<2	10
MW401_0.4-0.5	<5	<10	<1	<2	8	10	21	<0.1	3	34
MWQ04	<5	<10	<1	<2	10	11	24	<0.1	4	37
MW401_0.9-1.0	<5	20	<1	<2	14	14	270	<0.1	9	78
MW402_0.0-0.1	6	110	<1	4	13	15	36	<0.1	8	48
MW402_0.4-0.5	6	30	<1	2	16	18	760	<0.1	20	171
TP320_0.1-0.2	6	320	<1	6	<5	13	47	<0.1	<2	20
TP432_0-0.1	7	70	<1	11	<5	30	76	<0.1	3	25
TP432_0.4-0.5	6	70	<1	9	5	21	99	<0.1	4	61
TPQ-051	5	60	<1	7	<5	16	34	<0.1	3	17
TP434_0-0.1	7	110	<1	6	77	28	<5	<0.1	7	38
TP434_0.4-0.5	<5	60	<1	6	45	28	5	<0.1	37	138
TP435_0.0-0.1	6	110	<1	10	<5	16	23	<0.1	3	19
TP436_0.0-0.1	6	140	<1	7	8	19	359	<0.1	7	74
TP436_0.9-1.0	6	20	<1	12	<5	11	29	<0.1	2	9
TP437_0.0-0.1	5	70	<1	4	<5	18	36	<0.1	2	14
TP438_0-0.1	<5	70	<1	6	<5	11	15	<0.1	<2	9
TP439_0.0-0.1	9	70	<1	3	<5	13	42	<0.1	3	40
TP439_2.7-2.8	<5	20	<1	<2	<5	6	57	<0.1	3	35
TP440_0.4-0.5	<5	10	<1	<2	<5	7	<5	<0.1	<2	41
TP441_0.0-0.1	5	100	<1	4	14	20	372	<0.1	8	61
TP441_2.7-2.8	5	100	<1	5	17	12	169	<0.1	14	101
TPQ064	6	80	<1	6	16	12	205	<0.1	16	150
TP442_0.2-0.4	<5	30	<1	2	<5	8	92	<0.1	4	40
TP443_0.0-0.1	<5	40	<1	<2	<5	9	29	<0.1	3	28
TP443_0.3-0.4	16	140	<1	3	58	27	56	<0.1	11	97

Field_ID	TRH - NEPM 2013: C6-C10 minus BTEX (F1)	C6 - C10 Fraction	>C10-C16 minus Naphthalene (F2)	>C10 - C16 Fraction	>C16 - C34 Fraction (F3)	>C34 - C40 Fraction (F4)	>C10 - C40 (Sum of Total)	BTEX: Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR	10	10	50	50	100	100	50	0.2	0.5	0.5	0.5	0.5	0.5	0.2
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand[5]														
0-1m	45		110					0.5	160	55			40	
1-2m	70		240					0.5	220	NL			60	
2-4m	110		440					0.5	310	NL			95	
>4m	200		NL					0.5	540	NL			170	
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand[5]														
0-1m	NL		NL					NL	NL	NL			NL	
1-2m	NL		NL					NL	NL	NL			NL	
2-4m	NL		NL					NL	NL	NL			NL	
>4m	NL		NL					NL	NL	NL			NL	
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil[6]														
0-2m	**180**		**120**		**300**	**2800**		**50**	**85**	**70**			**105**	
NEPM 2013 Table 1B(7) Management Limits in Res / Parkland, Coarse Soil[7]		700		1000	2500	10000								
CRCCare Soil Direct Contact HSL-A Residential (Low Density)[8]		4400		3300	4500	6300		100	14000	4500			12000	
CRCCare Soil Direct Contact HSL-B Residential (High Density)[8]		5600		4200	5800	8100		140	21000	5900			17000	
CRCCare Soil Direct Contact HSL-C Recreational / Open Space[8]		5100		3800	5300	7400		120	18000	5300			15000	
CRCCare Soil Direct Contact Intrusive Works[9]		82000		62000	85000	120000		1100	120000	85000			130000	
CRCCare Soil HSL Vap Int Intrusive Works 0 to <2m Sand[10]		NL		NL				77	NL	NL			NL	
CRCCare Soil HSL Vap Int Intrusive Works 2 to <4m Sand[10]		NL		NL				160	NL	NL			NL	
HA410_0.0-0.1	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
HA411_0.0-0.1	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
HA412_0.0-0.1	<10	<10	50	50	190	<100	240	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
HA413_0.0-0.1	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
HA414_0.0-0.1	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
HA414_0.4-0.5	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
MW401_0.4-0.5	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
MWQ04	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
MW401_0.9-1.0	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
MW402_0.0-0.1	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
MW402_0.4-0.5	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
TP320_0.1-0.2	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
TP432_0-0.1	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
TP432_0.4-0.5	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
TPQ-051	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
TP434_0-0.1	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
TP434_0.4-0.5	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
TP435_0.0-0.1	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
TP436_0.0-0.1	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
TP436_0.9-1.0	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
TP437_0.0-0.1	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
TP438_0-0.1	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
TP439_0.0-0.1	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
TP439_2.7-2.8	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
TP440_0.4-0.5	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
TP441_0.0-0.1	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
TP441_2.7-2.8	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
TPQ064	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
TP442_0.2-0.4	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
TP443_0.0-0.1	<10	<10	<50	<50	<100	<100	<50	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2
TP443_0.3-0.4	<10	<10	<50	<50	130	<100	130	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2

Field_ID	PAH: Pyrene	Acenaphthene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b+j)fluoranthene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	PAHs (Sum of detections)	Benzo(a)pyrene TEQ (zero) - Lab Calc	Benzo(a)pyrene TEQ (half LOR) - Lab Calc	Benzo(a)pyrene TEQ (LOR) - Lab Calc	Benzo(a)pyrene TEQ (lower bound) *	Benzo(a)pyrene TEQ (upper bound) *
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	-	0.5	0.5	0.5	0.5	0.5
NEPM 2013 Site Specific EIL-Urban Residential (Disturbed)[3]													170							
NEPM 2013 Site Specific EIL-Urban Residential (Undisturbed)3													170							
NEPM 2013 Table 1A(1) HILs Res A Soil[4]															300	3	3	3		
NEPM 2013 Table 1A(1) HILs Res B Soil[4]															400	4	4	4		
NEPM 2013 Table 1A(1) HILs Rec C Soil[4]															300	3	3	3		
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand[5]																				
0-1m													3							
1-2m													NL							
2-4m													NL							
>4m													NL							
NEPM 2013 Table 1A(3) Rec C Soil HSL for Vapour Intrusion, Sand[5]																				
0-1m													NL							
1-2m													NL							
2-4m													NL							
>4m													NL							
NEPM 2013 Table 1B(6) ESLs for Urban Res, Coarse Soil[6]																				
0-2m					**0.7**															
CRCCare Soil Direct Contact HSL-A Residential (Low Density)[8]													1400							
CRCCare Soil Direct Contact HSL-B Residential (High Density)[8]													2200							
CRCCare Soil Direct Contact HSL-C Recreational / Open Space[8]													1900							
CRCCare Soil Direct Contact Intrusive Works[9]													29000							
CRCCare Soil HSL Vap Int Intrusive Works 0 to <2m Sand[10]													NL							
CRCCare Soil HSL Vap Int Intrusive Works 2 to <4m Sand[10]													NL							
HA410_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
HA411_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
HA412_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
HA413_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
HA414_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
HA414_0.4-0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
MW401_0.4-0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	-	0.6	-	<0.5	1.2
MWQ04	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
MW401_0.9-1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
MW402_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
MW402_0.4-0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	0.5	-	0.6	-	<0.5	1.2
TP320_0.1-0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP432_0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP432_0.4-0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TPQ-051	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP434_0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP434_0.4-0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP435_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-
TP436_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-
TP436_0.9-1.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-
TP437_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP438_0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP439_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP439_2.7-2.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP440_0.4-0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP441_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP441_2.7-2.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TPQ064	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP442_0.2-0.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	-	0.6	-	<0.5	1.2
TP443_0.0-0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-
TP443_0.3-0.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.2	-	-

Field_ID	OC Pesticides: Aldrin + Dieldrin	Chlordane	4,4 DDT	DDT+DDE+DDD - Lab Calc	Endosulfan	Endrin	Heptachlor	Hexachlorobenzene	Methoxychlor	PCBs: PCBs (Total)
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR	0.05	0.05	0.2	0.05	0.05	0.05	0.05	0.05	0.2	0.1
NEPM 2013 Site Specific EIL-Urban Residential (Disturbed)[3]			180	180						
NEPM 2013 Site Specific EIL-Urban Residential (Undisturbed)3			180	180						
NEPM 2013 Table 1A(1) HILs Res A Soil[4]	6	50		240	270	10	6	10	300	1
NEPM 2013 Table 1A(1) HILs Res B Soil[4]	10	90		600	400	20	10	15	500	1
NEPM 2013 Table 1A(1) HILs Rec C Soil[4]	10	70		400	340	20	10	10	400	1
HA410_0.0-0.1	-	-	-	-	-	-	-	-	-	-
HA411_0.0-0.1	-	-	-	-	-	-	-	-	-	-
HA412_0.0-0.1	-	-	-	-	-	-	-	-	-	-
HA413_0.0-0.1	-	-	-	-	-	-	-	-	-	-
HA414_0.0-0.1	-	-	-	-	-	-	-	-	-	-
HA414_0.4-0.5	-	-	-	-	-	-	-	-	-	-
MW401_0.4-0.5	-	-	-	-	-	-	-	-	-	-
MWQ04	-	-	-	-	-	-	-	-	-	-
MW401_0.9-1.0	-	-	-	-	-	-	-	-	-	-
MW402_0.0-0.1	-	-	-	-	-	-	-	-	-	-
MW402_0.4-0.5	-	-	-	-	-	-	-	-	-	-
TP320_0.1-0.2	-	-	-	-	-	-	-	-	-	-
TP432_0-0.1	-	-	-	-	-	-	-	-	-	-
TP432_0.4-0.5	-	-	-	-	-	-	-	-	-	-
TPQ-051	-	-	-	-	-	-	-	-	-	-
TP434_0-0.1	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1
TP434_0.4-0.5	-	-	-	-	-	-	-	-	-	-
TP435_0.0-0.1	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1
TP436_0.0-0.1	-	-	-	-	-	-	-	-	-	-
TP436_0.9-1.0	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1
TP437_0.0-0.1	-	-	-	-	-	-	-	-	-	-
TP438_0-0.1	-	-	-	-	-	-	-	-	-	-
TP439_0.0-0.1	-	-	-	-	-	-	-	-	-	-
TP439_2.7-2.8	-	-	-	-	-	-	-	-	-	-
TP440_0.4-0.5	-	-	-	-	-	-	-	-	-	-
TP441_0.0-0.1	-	-	-	-	-	-	-	-	-	-
TP441_2.7-2.8	-	-	-	-	-	-	-	-	-	-
TPQ064	-	-	-	-	-	-	-	-	-	-
TP442_0.2-0.4	-	-	-	-	-	-	-	-	-	-
TP443_0.0-0.1	-	-	-	-	-	-	-	-	-	-
TP443_0.3-0.4	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.1

[1] Criteria derived based on USEPA Toxicity derivation, and Region IX exposure factors (USEPA 2009b)
[2] US EPA Residential Soil Regional Screening Level
[3] NEPM 2013 Soil Ecological Investigation Levels for urban residential site specific conditions, including disturbed and undisturbed soil
[4] NEPM 2013 Table 1A(1) Health Investigation Levels - HIL A Residential (with soil access), HIL B Residential (without soil access) and HIL C Recreational
[5] NEPM 2013 Soil Health Screening Levels for vapour intrusion - HSL A & HSL B, Low-high density residential and HSL C, Recreational/Open Space - Sand
[6] NEPM 2013 Table 1B(6) Ecological Screening Levels for Urban residential and public open space, Coarse Soil
[7] NEPM 2013 Table 1B(7) Management Limits for Residential/Parkland, Coarse Soil
[8] CRC Care Soil Direct Contact Health Screening Levels A for low density residential, B for high density residential and C for Recreational/Open Space
[9] CRC Care Soil Direct Contact Intrusive Works
[10] CRC Care Soil Health Screening Levels for vapour intrusion for intrusive works - 0 to <2 m and 2 to <4m - Sand
[11] Material type descriptions have been abbreviated as follows: UC = Undisturbed Carbonaceous, DC = Disturbed Carbonaceous, U = Undisturbed, D = Disturbed

Appendix C
Table 4
Analytical Results - Surface Water and Groundwater

Field_ID	Location_Code	Sampled_Date_Time	Sample_Type	Lab_Report_Number	Area	PFOS and PFOA			Metals							
						PFOS	PFOA	6:2 Fluorotelomer Sulfonate (6:2 FtS)	Arsenic (Filtered)	Cadmium (Filtered)	Chromium (III+VI) (Filtered)	Copper (Filtered)	Lead (Filtered)	Mercury (Filtered)	Nickel (Filtered)	Zinc (Filtered)
						mg/L	mg/L	ug/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR						0.00001	0.00001	0.1	0.001	0.0001	0.001	0.001	0.001	0.0001	0.001	0.005
ANZECC 2000 FW Med-Low Reliability[1]									0.013[5]	0.0002		0.0014	0.0034		0.011	0.008
NEPM 2013 Table 1A(4) Res HSL A & B GW for Vapour Intrusion, Sand[2]																
2-4m																
4-8m																
>8m																
NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand[2]																
2-4m																
4-8m																
>8m																
NEPM 2013 Table 1C GILs, Fresh Waters[3]										0.0002		0.0014	0.0034	0.00006	0.011	0.008
Federal Environmental Quality Guidelines[4]						**0.006**										
MW403D	MW403D	26/10/2015	Normal	ES1534541	1	-	-	-	0.001	<0.0001	<0.001	0.002	<0.001	<0.0001	0.006	<0.005
MW403S	MW403S	26/10/2015	Normal	ES1534541	1	-	-	-	0.002	0.0054	<0.001	0.006	0.009	<0.0001	0.152	1.27
SW401	SW401	26/10/2015	Normal	ES1534541	1	-	-	-	0.002	<0.0001	<0.001	0.001	0.005	<0.0001	0.01	0.013
MW400D	MW400D	26/10/2015	Normal	ES1534541	2	-	-	-	0.001	<0.0001	<0.001	<0.001	<0.001	<0.0001	0.002	0.021
SW403	SW403	27/10/2015	Normal	ES1534594	2	<0.00001	<0.00001	<0.1	<0.001	0.0002	<0.001	<0.001	<0.001	<0.0001	0.02	0.213
SWQ	SW403	27/10/2015	Field_D	ES1535751	2	-	-	-	<0.001	0.0002	<0.001	0.001	<0.001	<0.0001	0.022	0.216
MW404D	MW404D	26/10/2015	Normal	ES1534541	3	-	-	-	<0.001	<0.0001	<0.001	0.001	<0.001	<0.0001	0.134	0.046
MW404S	MW404S	26/10/2015	Normal	ES1534541	3	-	-	-	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.0001	0.017	0.03
SW402	SW402	26/10/2015	Normal	ES1534541	3	<0.00001	<0.00001	<0.1	<0.001	<0.0001	<0.001	<0.001	<0.001	<0.0001	0.002	<0.005
MW401	MW401	26/10/2015	Normal	ES1534541	4	-	-	-	0.012	<0.0001	<0.001	<0.001	<0.001	<0.0001	0.02	0.015
MW402	MW402	26/10/2015	Normal	ES1534541	4	-	-	-	0.003	<0.0001	<0.001	<0.001	<0.001	<0.0001	0.014	0.027

Field_ID	TRH - NEPM 2013							BTEX						
	C6-C10 minus BTEX (F1)	C6 - C10 Fraction	>C10-C16 minus Naphthalene (F2)	>C10 - C16 Fraction	>C16 - C34 Fraction (F3)	>C34 - C40 Fraction (F4)	>C10 - C40 (Sum of Total)	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	BTEX (Sum of Total) - Lab Calc
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
LOR	20	20	100	100	100	100	100	1	2	2	2	2	2	1
ANZECC 2000 FW Med-Low Reliability[1]								950	180	80	350			
NEPM 2013 Table 1A(4) Res HSL A & B GW for Vapour Intrusion, Sand[2]														
2-4m	1000		1000					800	NL	NL			NL	
4-8m	1000		1000					800	NL	NL			NL	
>8m	1000		1000					900	NL	NL			NL	
NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand[2]														
2-4m	NL		NL					NL	NL	NL			NL	
4-8m	NL		NL					NL	NL	NL			NL	
>8m	NL		NL					NL	NL	NL			NL	
NEPM 2013 Table 1C GILs, Fresh Waters[3]								950			350			
Federal Environmental Quality Guidelines[4]														
MW403D	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1
MW403S	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1
SW401	<20	<20	<100	<100	220	<100	220	<1	<2	<2	<2	<2	<2	<1
MW400D	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1
SW403	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1
SWQ	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1
MW404D	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1
MW404S	<20	<20	130	130	5060	3080	8270	<1	<2	<2	<2	<2	<2	<1
SW402	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1
MW401	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1
MW402	<20	<20	<100	<100	<100	<100	<100	<1	<2	<2	<2	<2	<2	<1

Field_ID	PAH																		
	PAHs (sum of detections)	Pyrene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo[b+j]fluoranthene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Benzo(a)pyrene TEQ (zero) - Lab Calc	Benzo(a)pyrene TEQ (lower bound) *
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
LOR	0.5	1	1	1	1	1	0.5	1	1	1	1	1	1	1	1	1	1	0.5	0.5
ANZECC 2000 FW Med-Low Reliability[1]					0.01		0.1						1			16	0.6		
NEPM 2013 Table 1A(4) Res HSL A & B GW for Vapour Intrusion, Sand[2]																			
2-4m																NL			
4-8m																NL			
>8m																NL			
NEPM 2013 Table 1A(4) Rec HSL C GW for Vapour Intrusion, Sand[2]																			
2-4m																NL			
4-8m																NL			
>8m																NL			
NEPM 2013 Table 1C GILs, Fresh Waters[3]																16			
Federal Environmental Quality Guidelines[4]																			
MW403D	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	-
MW403S	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	-
SW401	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	-
MW400D	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	-
SW403	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<0.5
SWQ	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<0.5
MW404D	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	-
MW404S	31.1	3.1	<1	<1	<1	1.8	1.6	1.8	<1	2.3	2.7	<1	2.4	1.6	<1	<5 - 2.2	11.6	2	-
SW402	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	-
MW401	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	-
MW402	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	-

[1] ANZECC 2000 Medium to Low Reliability Guidelines for Freshwater
[2] NEPM 2013 Groundwater levels for vapour intruction for residential health screening level A & B and recreational health screening level C in sand
[3] NEPM 2013 Groundwater Investigation Levels for fresh water
[4] Federal Environment Quality Guidelines (Environment Canada 2013)
[5] As V